

# **The Michigan Trauma Quality Improvement Program**

**Ann Arbor, MI  
June 3, 2014**



# Agenda

- ◆ Announcements
- ◆ Lean Healthcare
- ◆ Data Validation
- ◆ Your Trauma Registry and the Input of Quality Data
- ◆ Discussion

# Announcements

- ◆ New Centers Submitting Data
  - Henry Ford Macomb Hospital
  - St. Joseph Mercy Oakland
  - McLaren Lapeer Regional Medical Center
- ◆ New Center (July)
  - MidMichigan Medical Center - Midland
- ◆ EMR Seating Concept











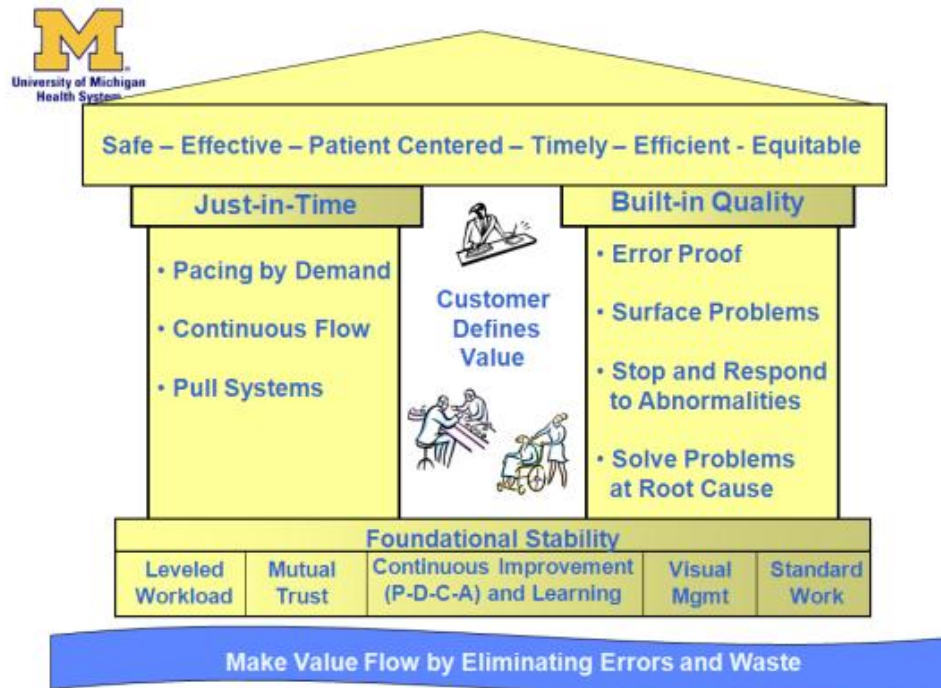


**THESE ARE MAGNETIC BREAKAWAYS**





# Lean Thinking Overview



# The Flip Side Of Lean



# What is Lean Thinking?

*“The endless transformation of waste into value from the customer’s perspective”.*

---James Womack  
author “Lean Thinking” 1996



# Why Lean?

*“It would be a lot easier if we could stop calling it lean and understand that it’s all about serving others, developing people and solving problems.”*

Jon Miller  
CEO Gemba



It's just a manufacturing thing, right?



**Healthcare is Different!**



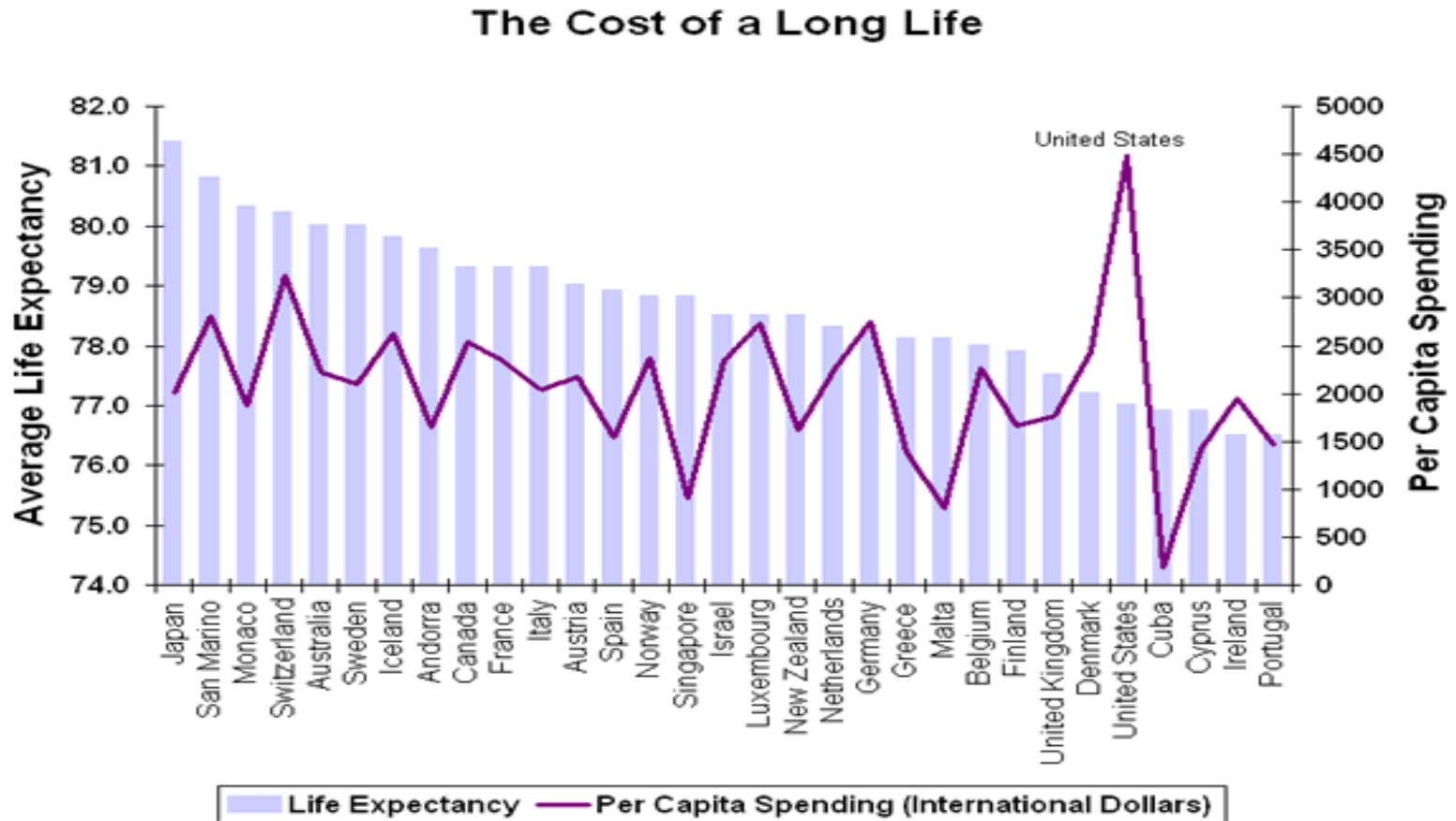
# Healthcare's

## ~~Manufacturing's~~ Ideal World

### Goods & Services

- ✓ Delivered Error Free
- ✓ Delivered On-time as requested
- ✓ Delivered Efficiently without waste
- ✓ Delivered Safely

# Why implement lean into the healthcare industry?







# A Quick Summary of Lean Thinking

- Do our work every day in a standard way that we created
  - *Not just the way the work evolved!*
- Be alert to things going wrong
  - *They always do!*
- Fix the problem now
  - *For this patient or co-worker*
- Find and fix the root causes of the problem
  - *So it never happens again!*

**Modified after Spear; Billi**

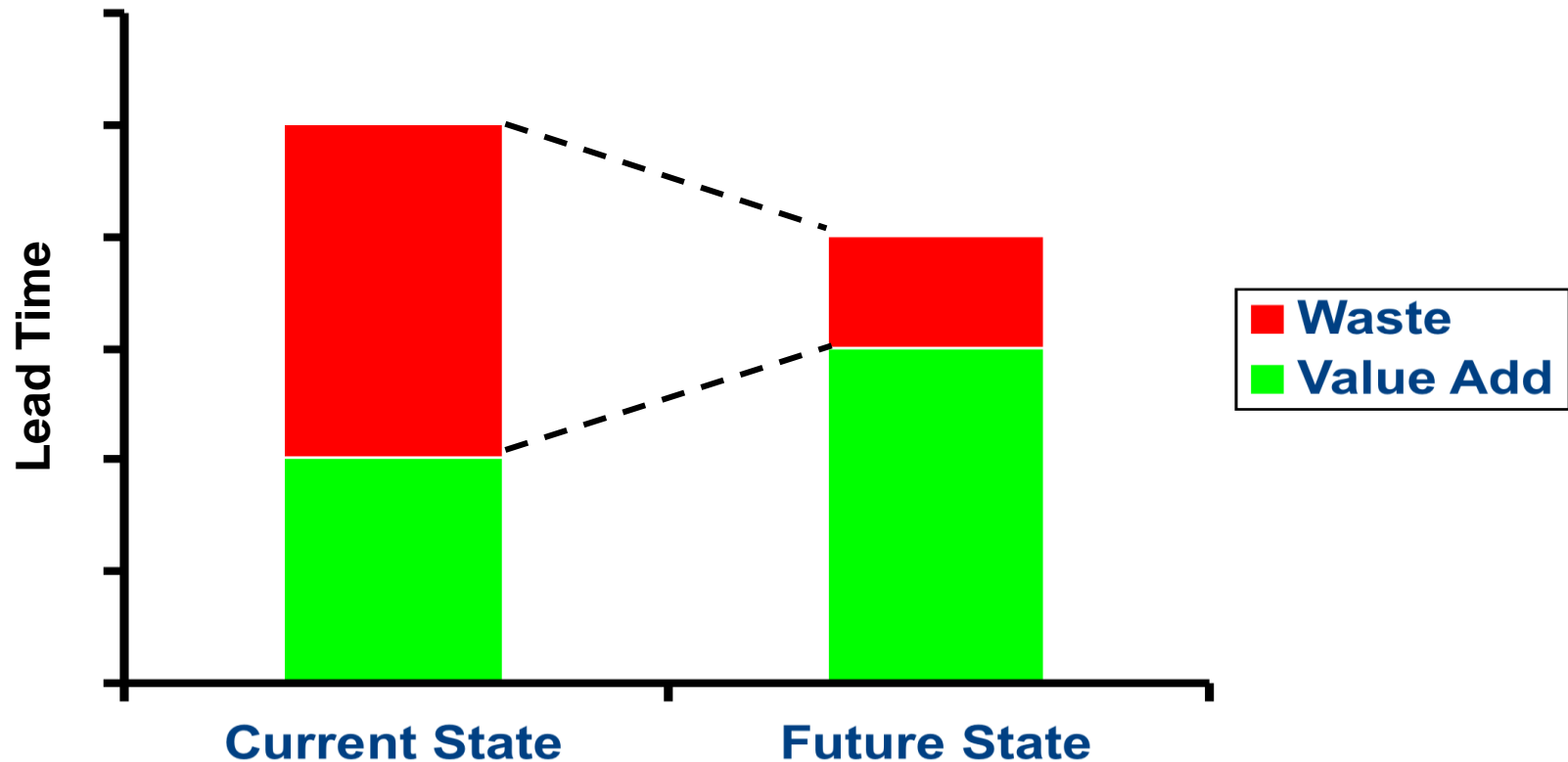
# How can we create (liberate) “20,000 problem solvers”?

- Help each worker take initiative to find and fix causes of problems he/she faces daily
  - This means each of us has two jobs:
    - *Do the work*
    - *Improve the work*
- Leaders' role:
  - Support improvement work (time, mentoring)
  - Align improvements so value flows to the customer



# The Objective of Our Lean Work

To increase **Value** Added Work and reduce **Waste** to Increase Throughput,  
Lower Cost and Improve Quality



# *What Is Waste?*

Any element of production, processing, or distribution that adds no value to the final product

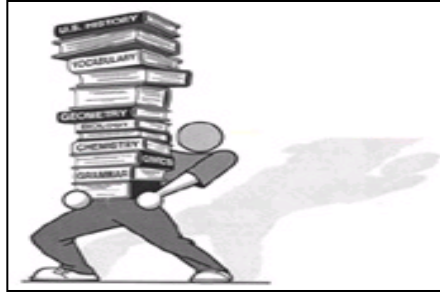
*Waste only adds cost & time to a process*

*Waste can be found:*

- *In areas with rework*
- *Areas experiencing long wait times*
- *Process steps requiring multiple reviews and revisions*
- *Areas where multiple handoffs occur within & across depts.*



# *How Does Waste Affect Us?*



*Steals our time!*



# *Waste Definitions*

**Correction:** Rework, work done because of errors in the previous process

**Overproduction:** Making more than is necessary or making things faster than is necessary, working ahead

**Motion:** Unnecessary people motions, travel, walking, searching

**Material Movement:** Unnecessary handoffs, transfers, filing, distances of material & information

**Waiting:** People waiting for machines, information or people. Information waiting on people or machines

**Inventory:** Information or material waiting in queue

**Processing:** Redundant or unnecessary mental or physical work; work that is giving the customer more than he/she is willing to pay for

**Variability:** A flow of information or product processes that are not regular or constant; the lack of consistency in schedules, products, and info. (**Unevenness**)

**Overburden:** Pushing a machine or people beyond their capabilities or what is considered reasonable. (**Unreasonable-ness**)

*Some add 8<sup>th</sup> waste of **Non-utilized talent***

# *Exercise: Waste in your Area*

## *Pair and Share*

| <b>Waste Category</b> | <b>Definition</b>   | <b>Your Examples</b> |
|-----------------------|---|----------------------|
| Correction            | Rework because of defects, low quality, errors  |                      |
| Overproduction        | Producing more, sooner, or faster than required by the next process<br>Inappropriate production |                      |
| Motion                | Unnecessary staff movement (travel, searching, walking)   |                      |
| Material Movement     | Unnecessary patient or material movement  |                      |
| Waiting               | People, machine, and information idle time  |                      |
| Inventory             | Information, material, or patient in queue or stock   |                      |
| Processing            | Redundant or unnecessary processing   |                      |



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# 7 Wastes Plus One More!

|                             |  |
|-----------------------------|--|
| <b>1. Correction</b>        | Lab order misread and incorrect test completed                                       |
| <b>2. Overproduction</b>    | Lab Results delivered to people who have not asked for them and will not read them   |
| <b>3. Motion</b>            | Lab tech walking around station to retrieve printed results                          |
| <b>4. Material Movement</b> | Moving specimen from the phlebotomy station to the lab                               |
| <b>5. Waiting</b>           | Patient and physician waiting for lab results  |
| <b>6. Inventory</b>         | Lab specimens awaiting testing   |
| <b>7. Processing</b>        | Lab results printed to triplicate forms that are separated and only one form is used |
| <b>8. Wasted Talent</b>     | Disregard lab tech's proposal to rearrange work area                                 |



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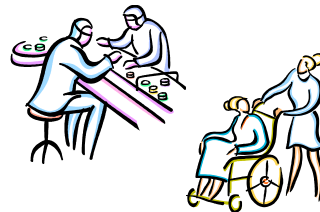
**Safe – Effective – Patient Centered – Timely – Efficient - Equitable**

**Just-in-Time**

- Pacing by Demand
- Continuous Flow
- Pull Systems



**Customer  
Defines  
Value**



**Built-in Quality**

- Error Proof
- Surface Problems
- Stop and Respond to Abnormalities
- Solve Problems at Root Cause

**Foundational Stability**

**Leveled  
Workload**

**Mutual  
Trust**

**Continuous Improvement  
(P-D-C-A) and Learning**

**Visual  
Mgmt**

**Standard  
Work**

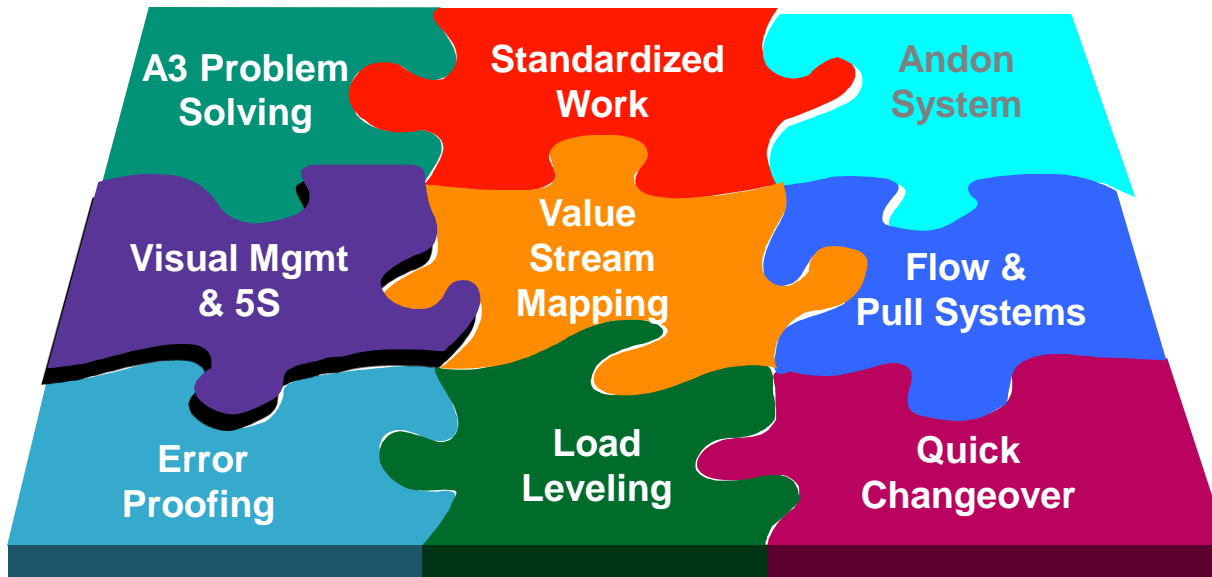
**Make Value Flow by Eliminating Errors and Waste**





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# Lean is a system...





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# ***“An Overview of Error Proofing”***

***Also referred to as....Mistake Proofing or Poka-Yoke  
(translation from Japanese “to avoid inadvertent errors”)***



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# Error-Proofing (Mistake Proofing)


- Allows a better process solution than a person-dependant solution
- Ensures 'Built-In-Quality'
- Examples:
  - Standardized forms with check-boxes rather than free-text
  - Anesthesia gas connections – color coded and unique



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## *Exercise: Error Proofing Pair and Share*

*What are some examples of error proofing that you have encountered in your work environment or the world at large?*



*Mistake Proofing the  
Design of Healthcare Processes,  
John Grout, Ph.D.  
(will email a copy)*



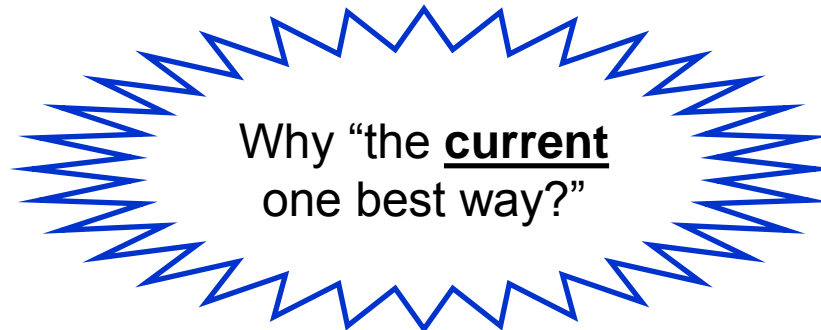
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# Standardized Work

## Definition:

The current one best way to safely complete an activity with the proper outcome and the highest quality, using the fewest possible resources



# Standardized Work Critical to Improvement Efforts

- Without the basis of Standardized Work there is no place for us to make improvements from
- A common misconception of Standardized Work...
  - ❖ Is that it robs us of our creativity – however, when implemented correctly the exact opposite is true!
- When implemented correctly...
  - ❖ It enables a flexible workforce
  - ❖ Significantly reduces errors
  - ❖ Significantly improves efficiency
  - ❖ Enables new initiatives to launch with greater success



# Should we Standardize all Healthcare Processes?

Why?

GREAT questions to ask....

- Does standardizing this method improve quality or safety?
- Within the process what portion of the work is of critical importance?
  - ❖ Typically 20% of the tasks within a process must be highly consistent



## Standardized Work Exercise – Individual Activity

- Think of an important Healthcare process that if NOT standardized would likely lead to Patient Harm
- This process will now be represented by the drawing of a pig (yes, that is right...an oink-oink pig...what else?)
- Please take the next minute or so to draw your pig on the provided blank piece of paper
- Upon completion, please hold your pig up for all to see!



## Standardized Work Exercise – Individual Activity

- This exercise helps illustrate the need for developing & training standardized work relative to this process!
- When developing standardized work, it is important to involve the folks who “do the work”
- For the sake of our exercise we will make the assumption this group worked together to create the standard work for our pig
- However, Standardized Work alone is never enough...people need off-line & OTJ Training as well as consistent standard reinforcing moments to become 2nd Nature
- Let’s complete some quick off-line & On The Job training on the agreed to standardized work (using the standard work instructions & one of the sheets of grid paper)

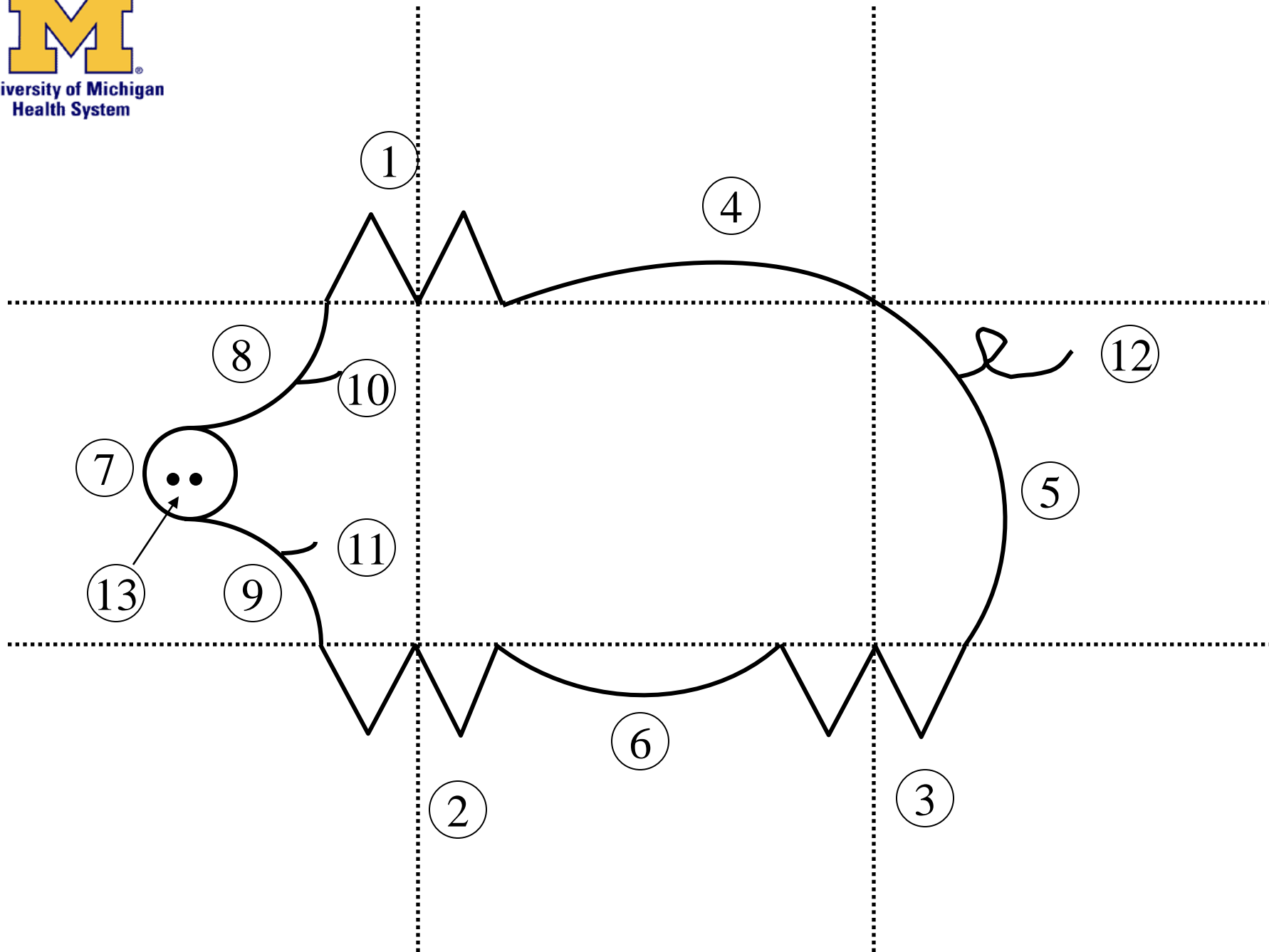


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Hand out Standardized Work  
& a piece of grid paper



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## Standardized Work Exercise – Individual Activity

- Take a look at the original pig vs. the new standardized pig...
  - ❖ Which one looks more like a pig?
  - ❖ Which pigs look more alike across the room?
    - The original pigs or the standardized pigs?
- It appears that our Patient is much safer this time!!!
- \*We should always improve on the current standard...for instance
  - ❖ Re-sequence steps so pen or pencil doesn't need to lift?
  - ❖ More definition to size of nose or ears?
  - ❖ Maybe add more grid lines?
- Remember, Standard Work must be SIMPLE and created by the folks doing the work so it is meaningful in real-time in our areas

\*“Standardized work without improvement would be a stagnant workplace that never improved. Improvement without the basis for standard work might be a chaotic environment where people randomly try new methods that do not necessarily improve the overall system” – Mark Graban



# ***Root Cause of Most Problems?***

- 80-90% of root causes comes down to either no standard/standardized process in place or a standard/standardized process not being followed
- A Clinical Example including Avoiding Blame



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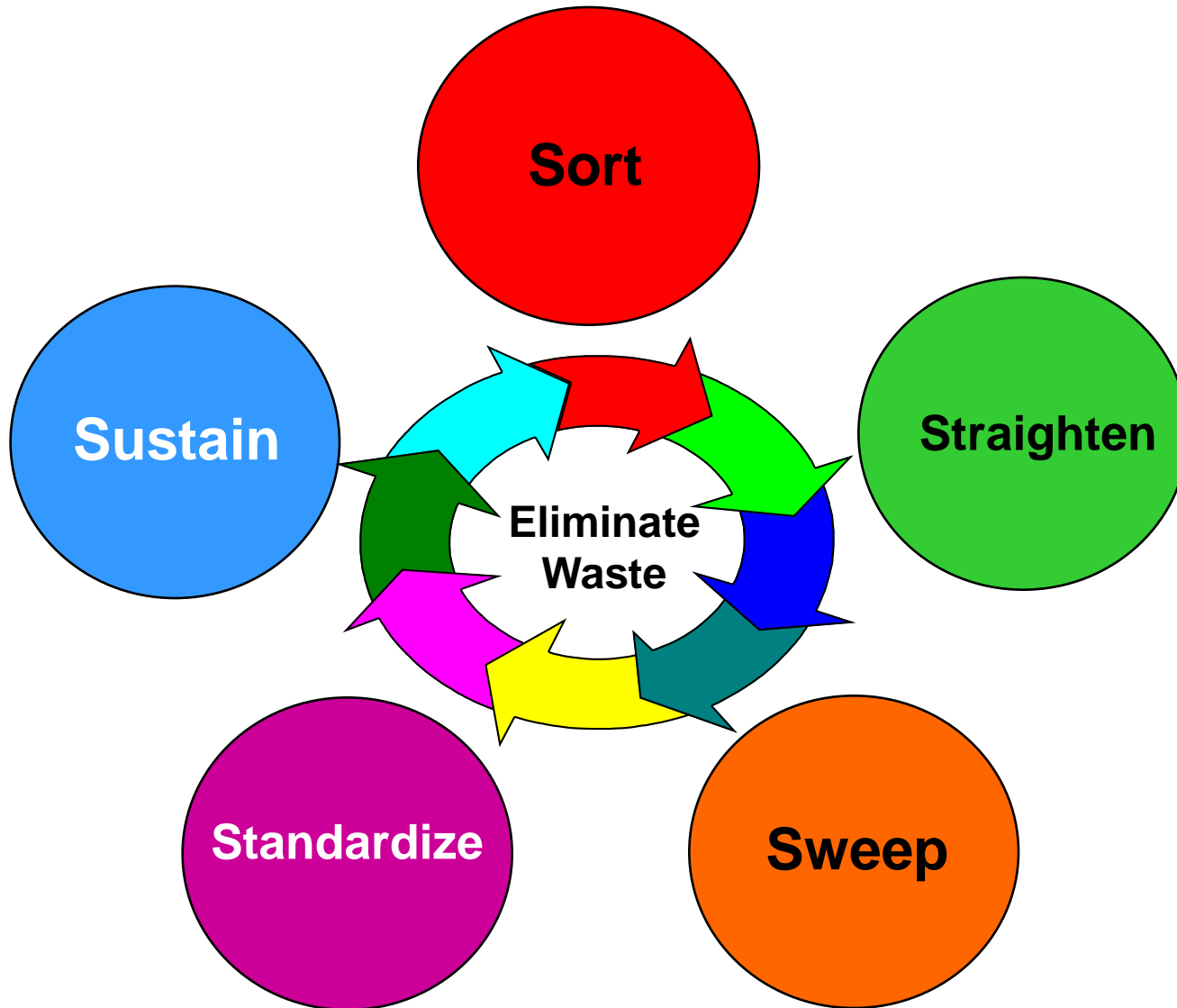
# **5S – Introduction To The Visual Workplace**

“5S methodology reduces waste through improved workplace organization and visual management...primary goal is to prevent problems and to create a work environment that allows people to provide the best patient care in the most effective way” - Mark Graban



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# Visual Workplace: The 5 S's





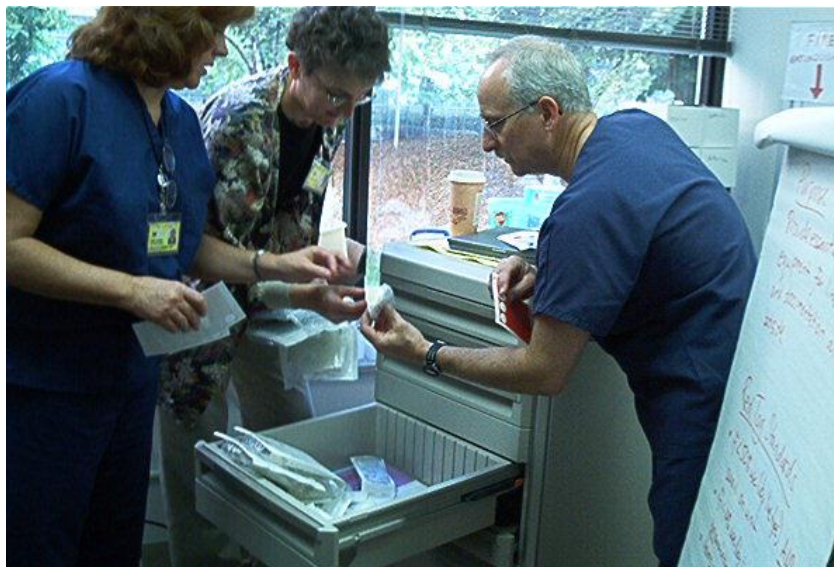
## The 5 S's: Visual Workplace

1. **Sort** – Sort through items, keep only what is needed while disposing of what is not.
2. **Straighten** (orderliness) – “A place for everything and everything in its place.”
3. **Sweep** (cleanliness) – The cleaning process often acts as a form of inspection that exposes abnormal conditions.
4. **Standardize** – Develop systems and procedures to maintain and monitor the first three S's.
5. **Sustain** (self-discipline) – Maintaining a stabilized workplace in an ongoing process of continuous improvement.

At Thedacare, 5S improvements helped reduce the amount of wasted time in an average nurse's 8 hour shift from 3.5 hours a day to just 1 hour per day



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Source: University of Michigan Health System





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# Office 5S Workshop

## Copier – Supply Room

**Before**



**After**



**Closed versus Open Storage**





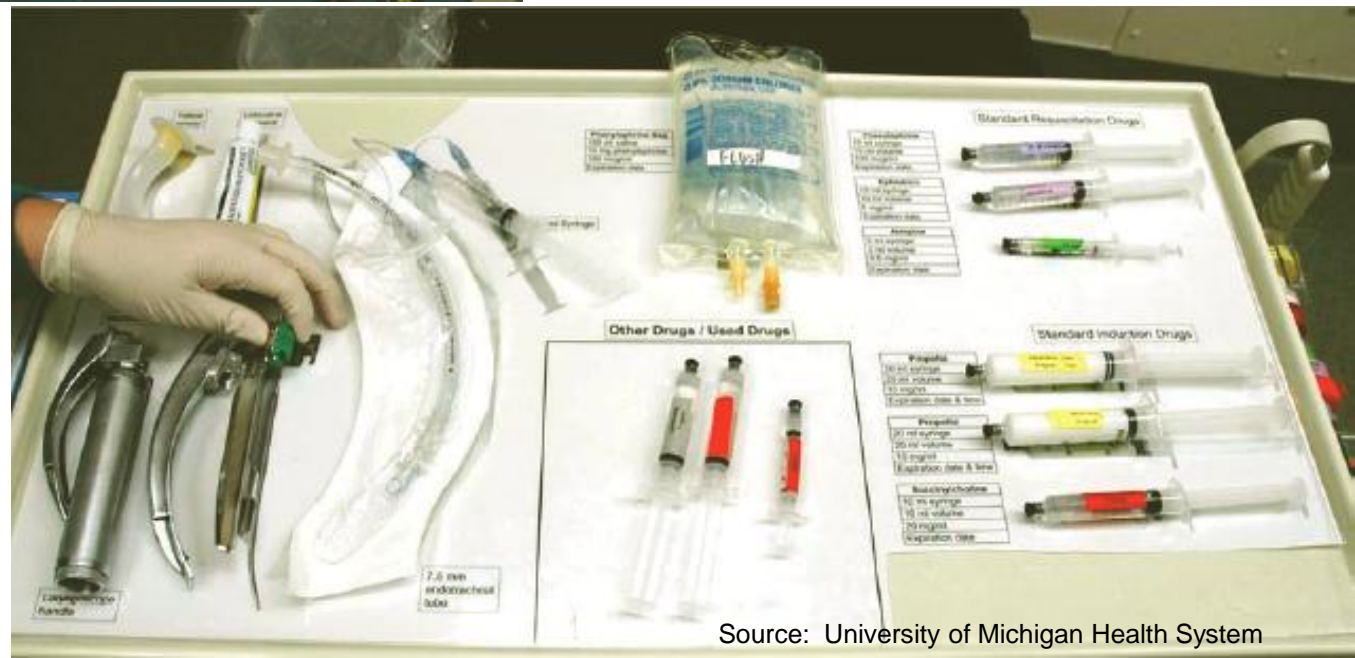
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## Anesthesia Board - Standardize



Before

After



Source: University of Michigan Health System



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# The 5S Numbers Game



## Game – Current State

- This sheet represents our current work place.
- Our job during a 20 second shift, is to strike out the numbers 1 to 49 in correct sequence.

Example: 1 2 3

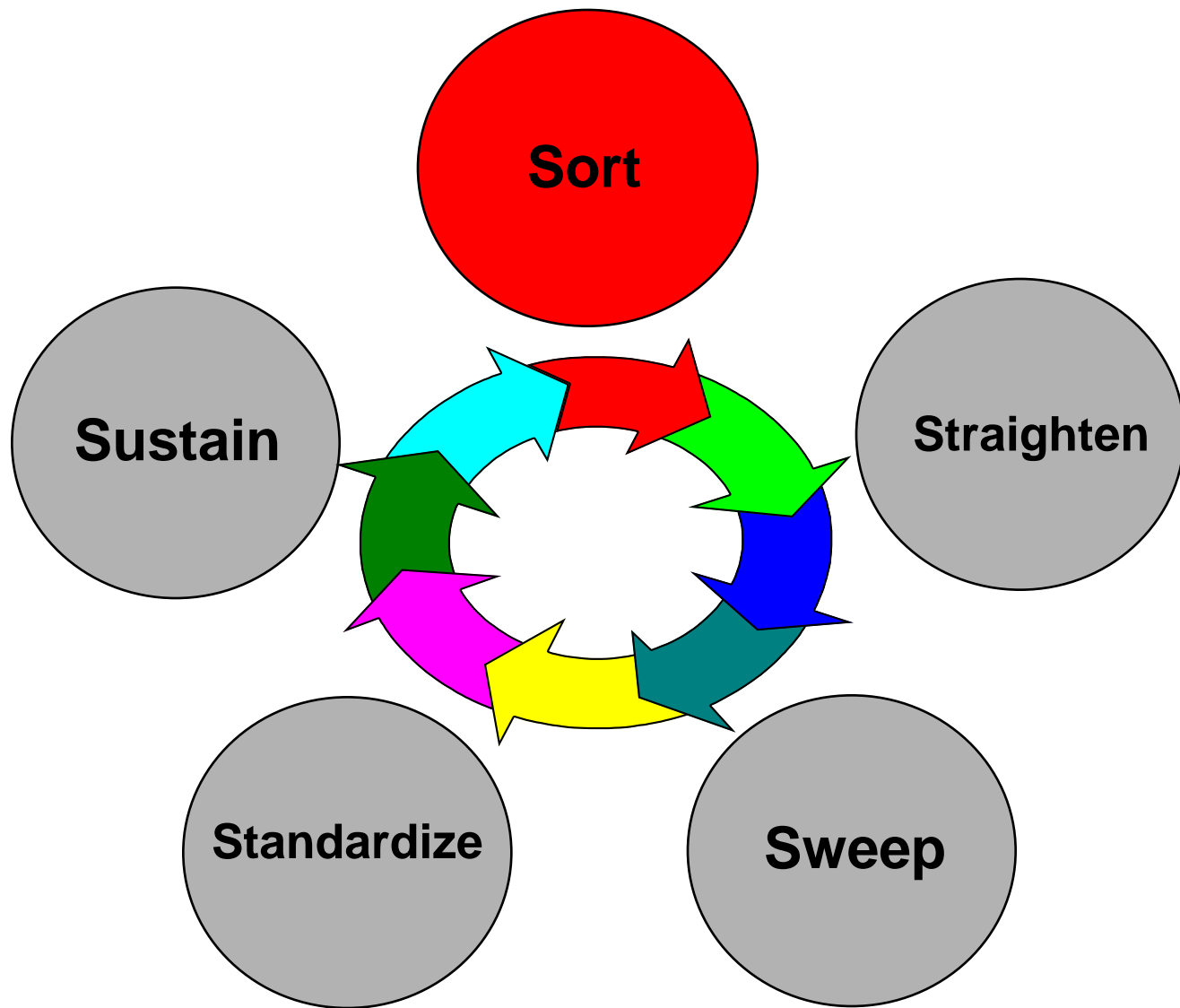
- The team score will be represented by the lowest individual score achieved.

## The Value of Workplace Organization



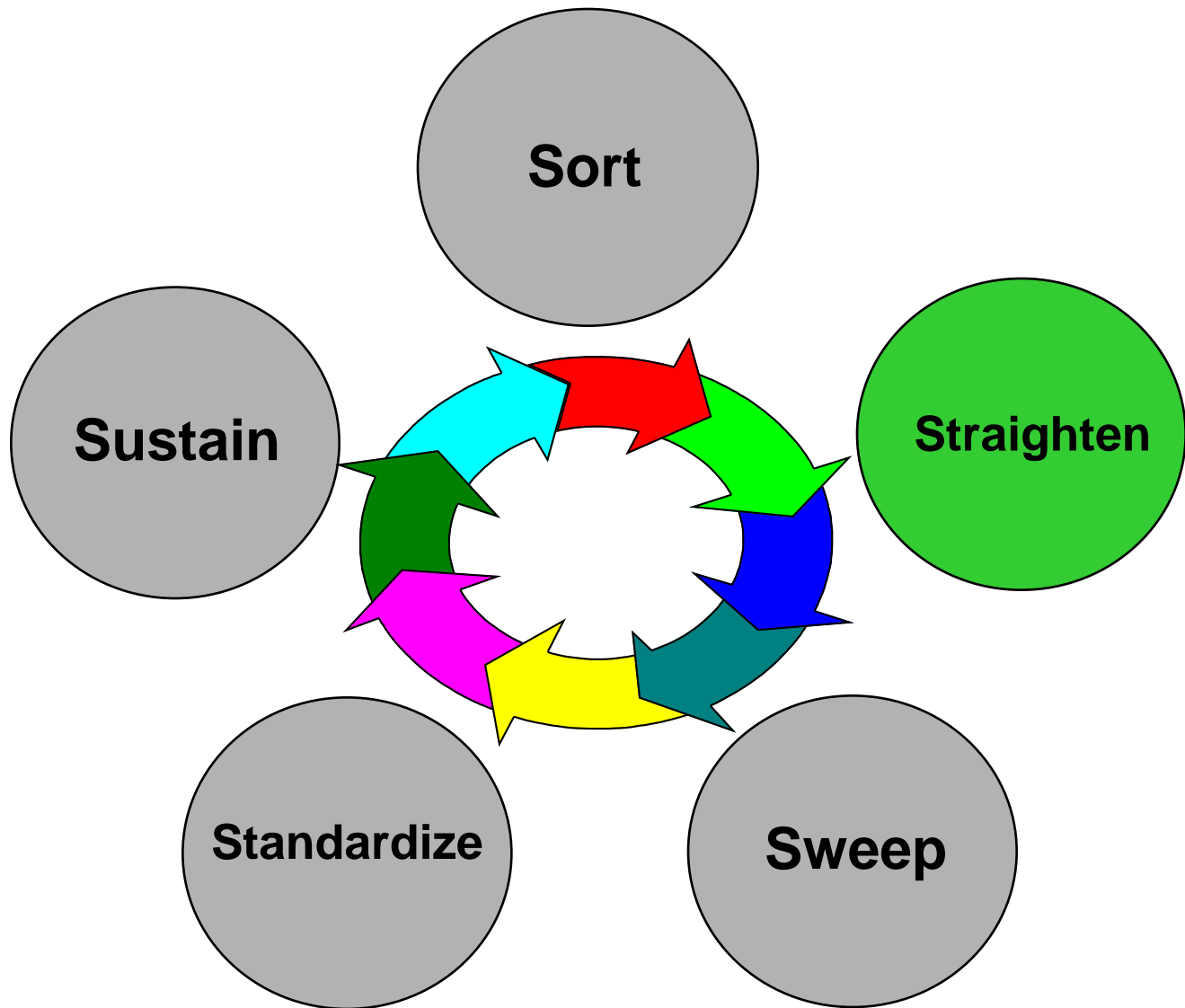


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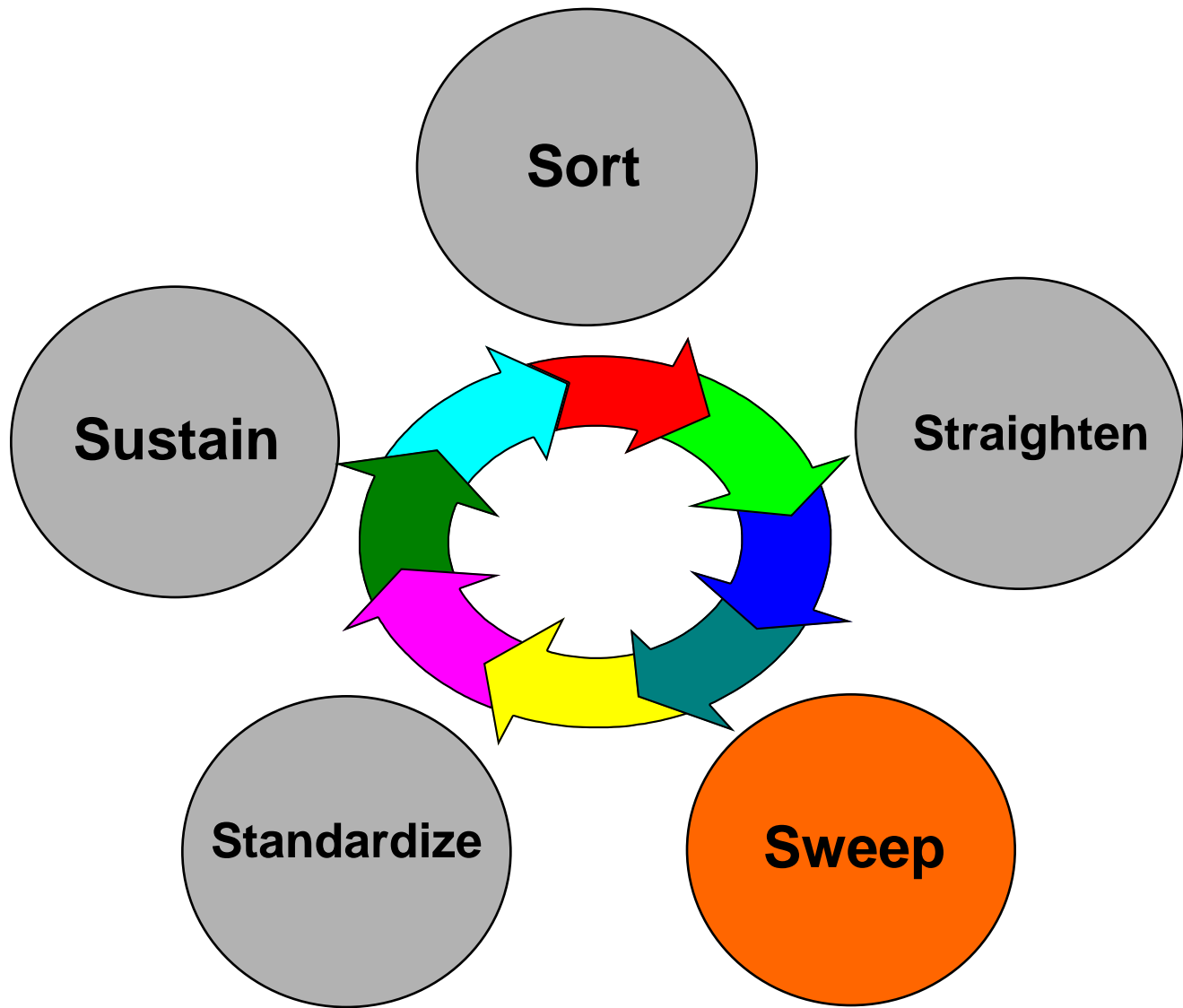
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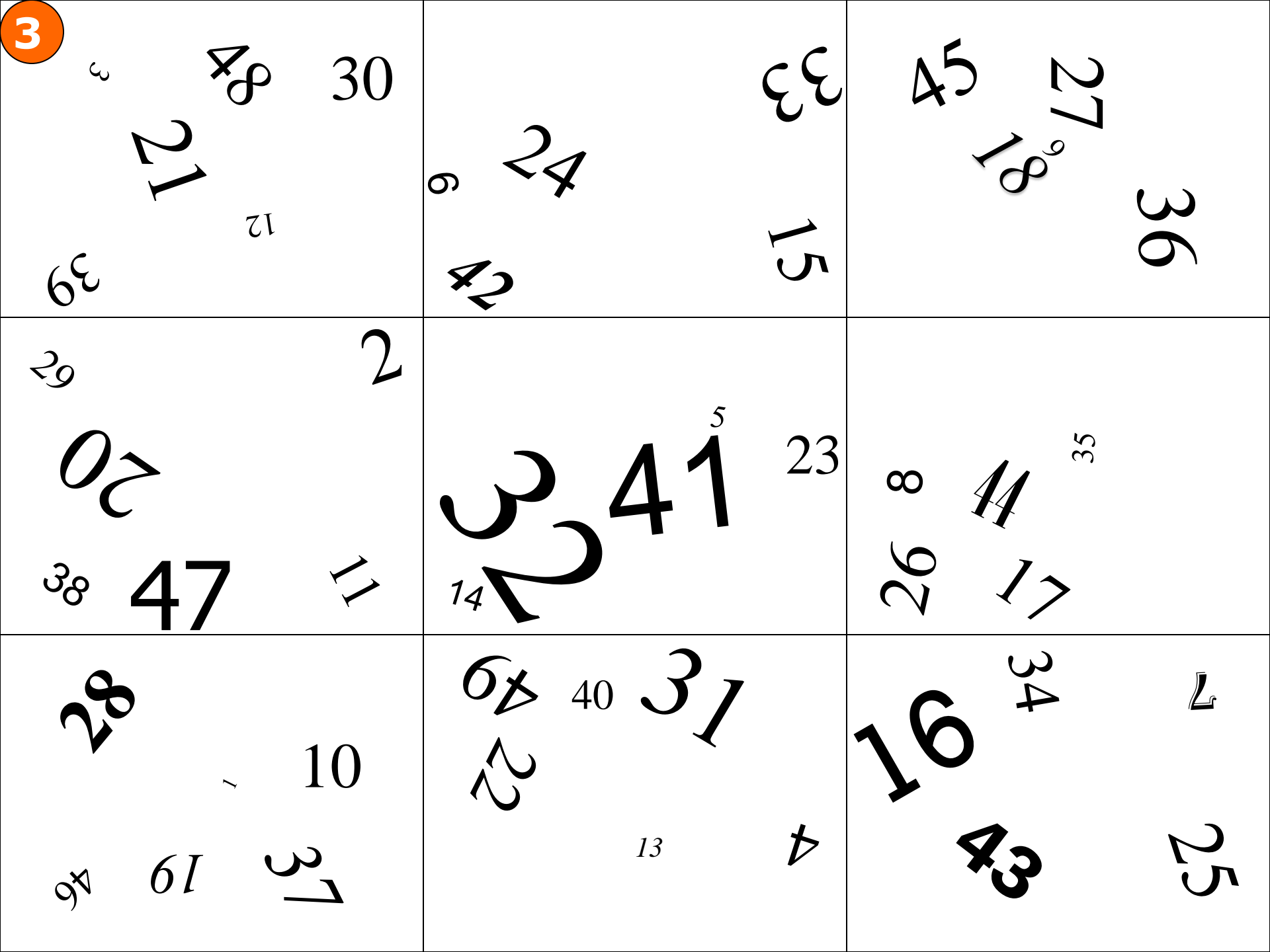






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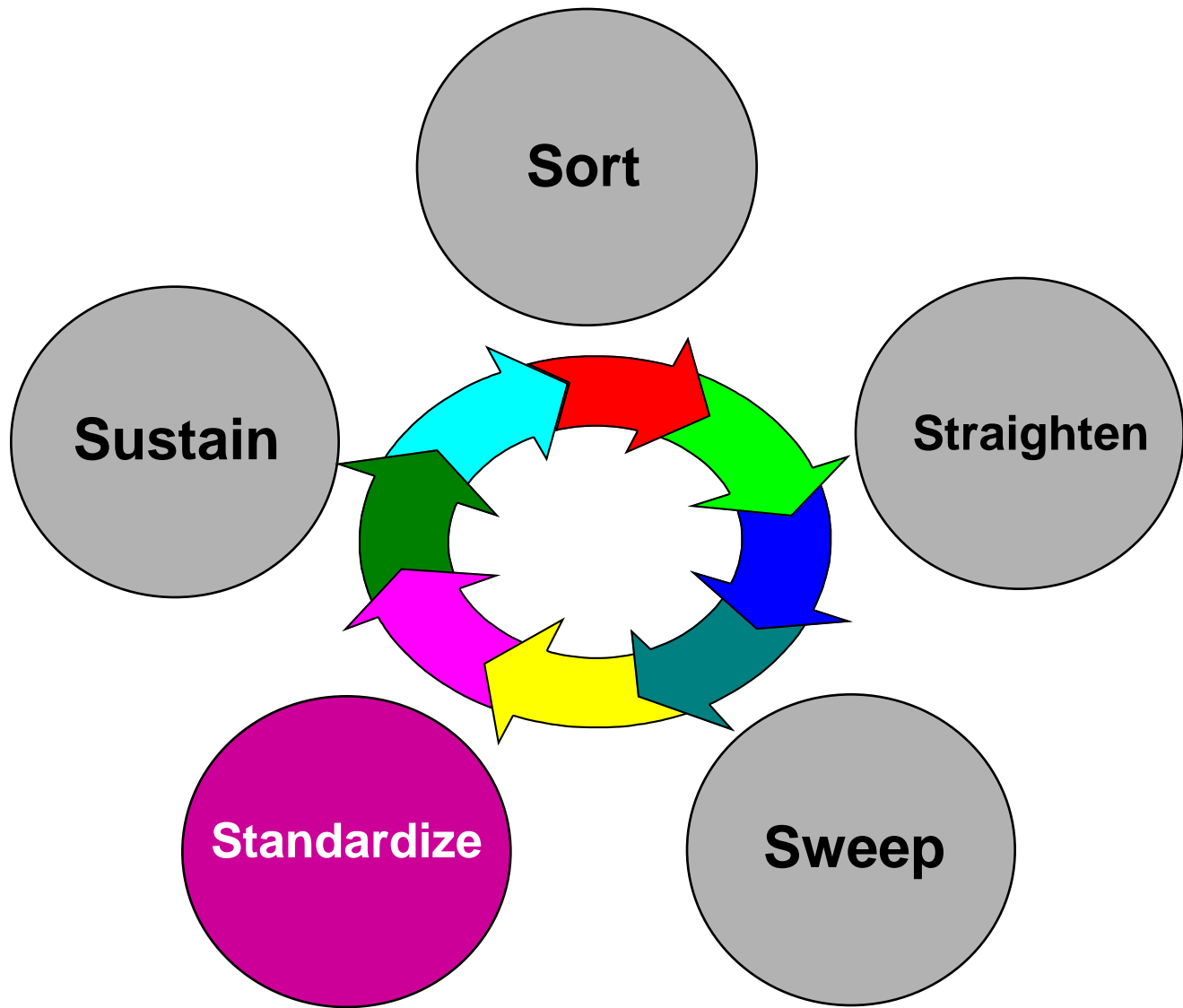


# Numbers from 1 to 49

|    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |    |

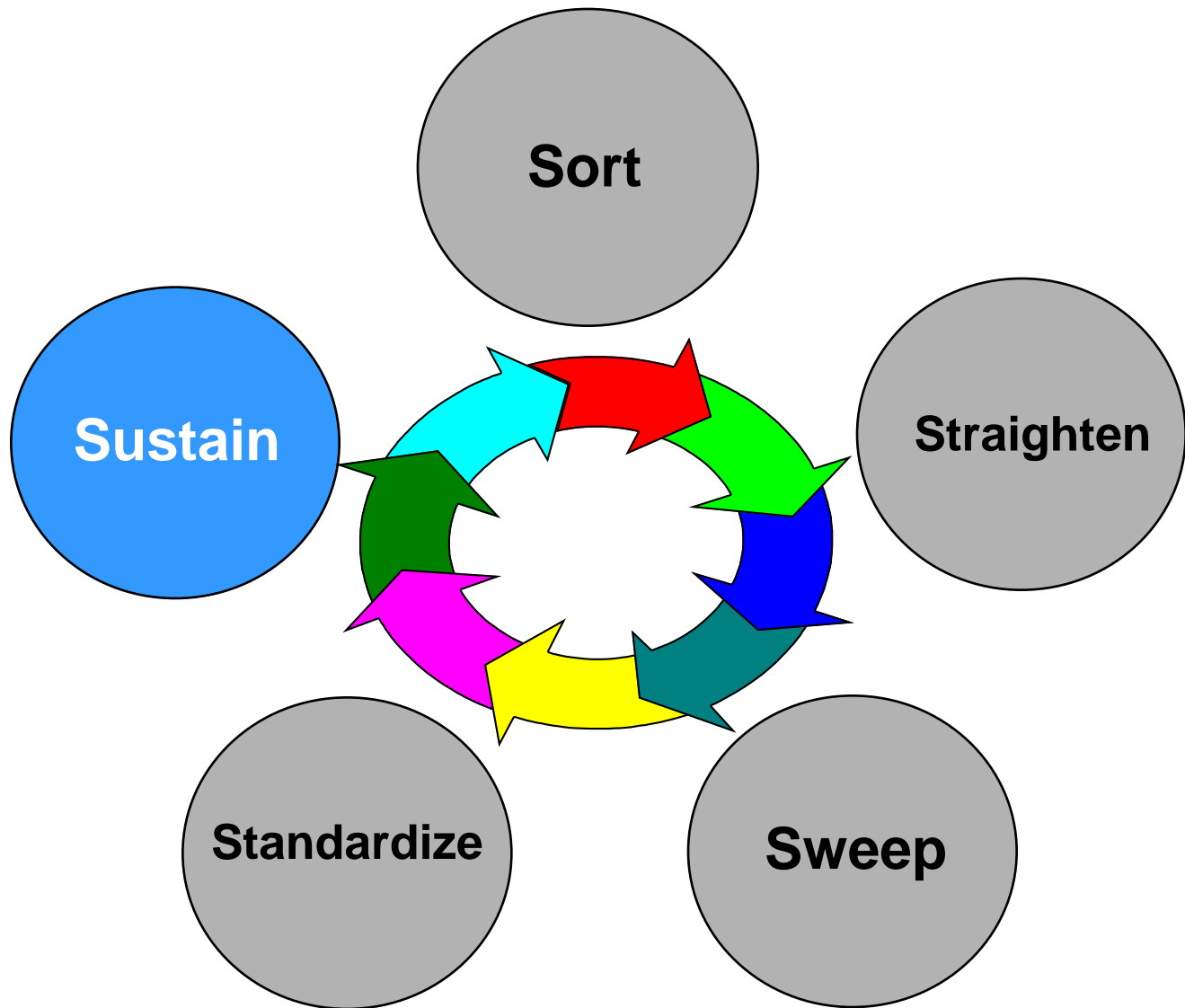


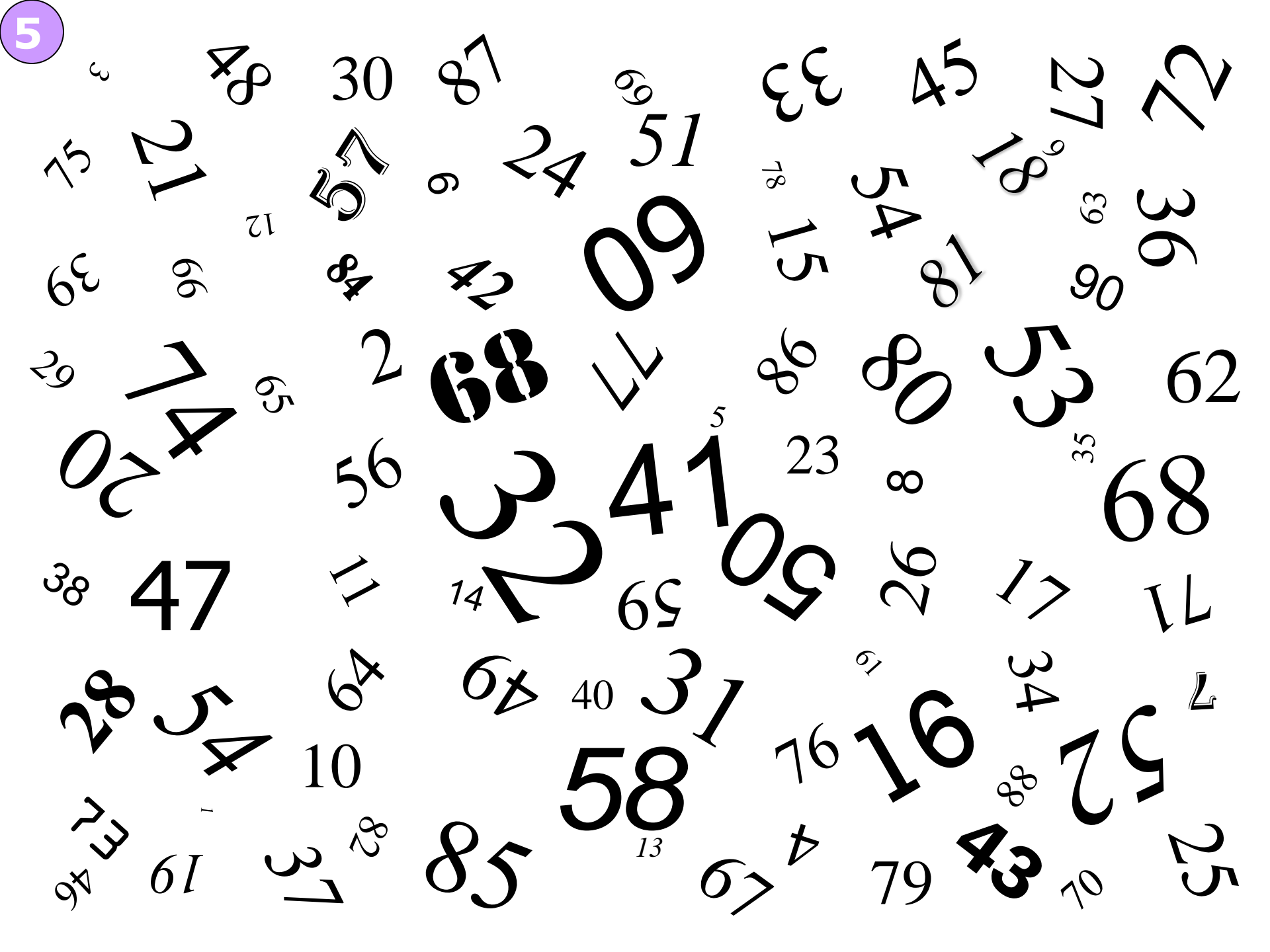
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# Find Missing Numbers

|           |           |           |    |    |           |           |           |    |    |
|-----------|-----------|-----------|----|----|-----------|-----------|-----------|----|----|
| 1         | 2         | 3         | 4  | 5  | 6         | 7         | 8         | 9  | 10 |
| 11        | 12        | 13        | 14 | 15 | <b>16</b> | 17        | 18        | 19 | 20 |
| 21        |           | 23        | 24 | 25 | 26        | 27        | <b>28</b> | 29 | 30 |
| 31        | <b>32</b> | 33        | 34 | 35 | 36        | 37        | 38        | 39 | 40 |
| <b>41</b> | 42        | <b>43</b> |    | 45 | 46        | <b>47</b> | 48        | 49 |    |



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# Before



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After



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# Benefits of Reducing Batches

Think Elevator vs. Escalator



# Benefits of Reducing Batches?

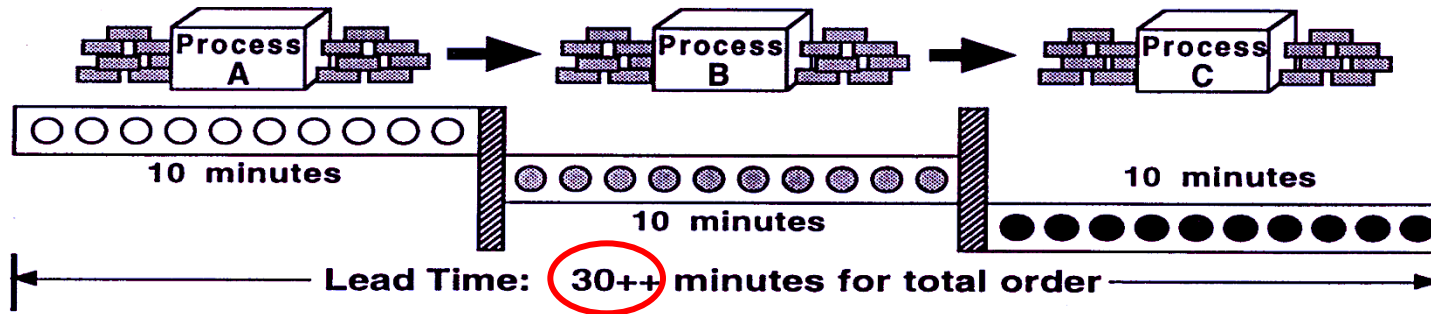
- Reducing Batches
  - Shortens Cycles for each Patient
  - Reduces Excess Inventory
  - Improves Quality
  - Improves Responsiveness



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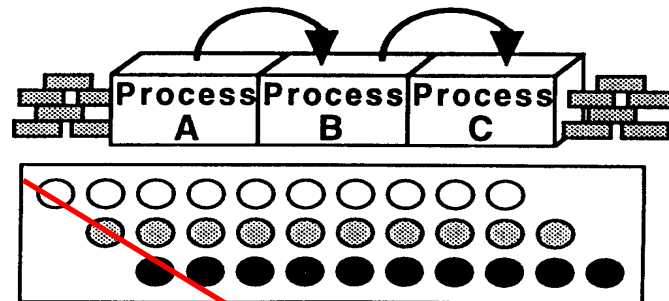
# Simple Process Flow & Small Lots

## Batch & Push Processing



21 minutes for first piece

## Continuous Flow “make one, move one”



3 Minutes for first piece

12 Minutes for total order

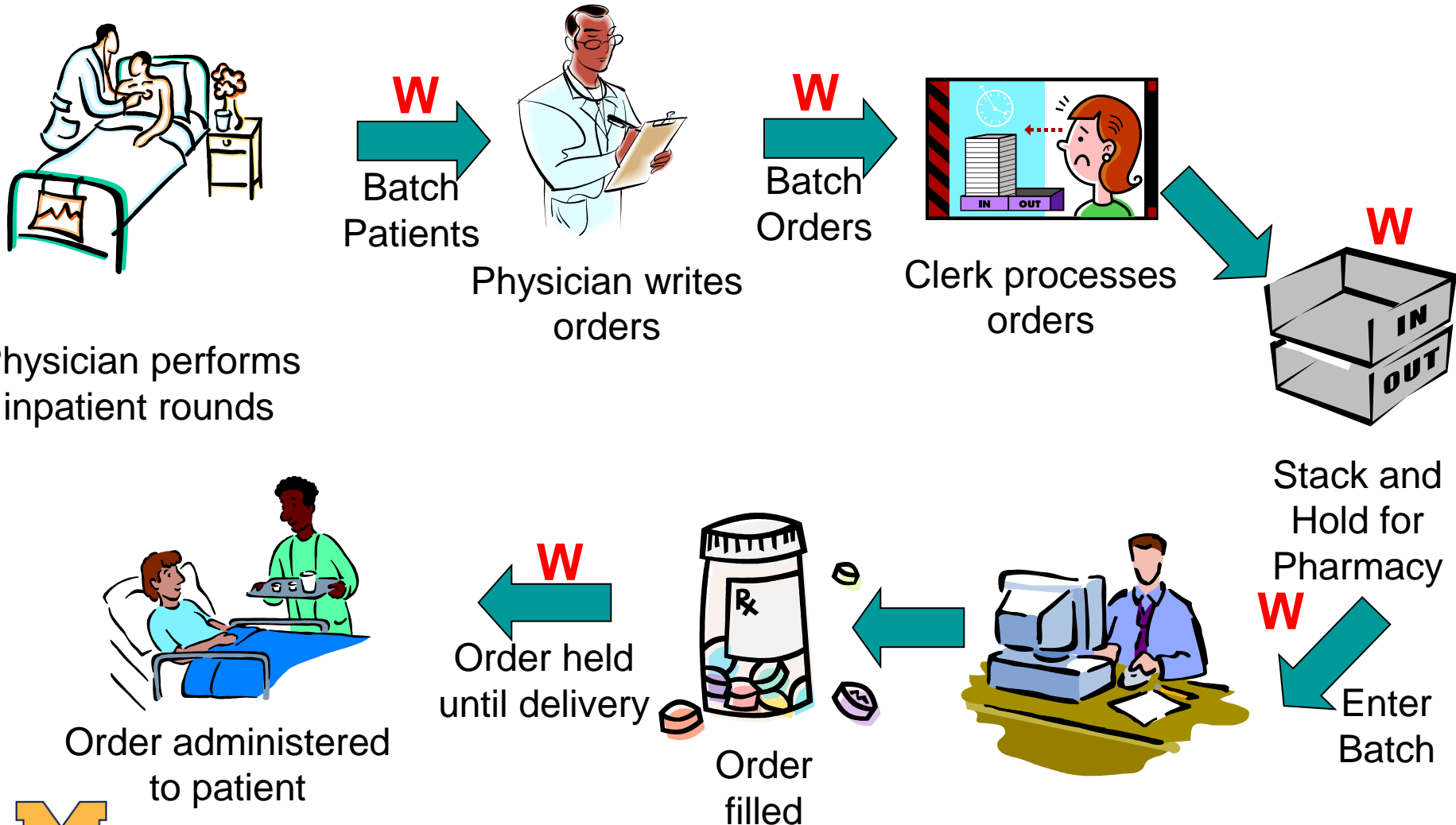


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# Example: Batching & Multiple Handoffs



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**Incorporate Lean Principles When Planning Your Future State**

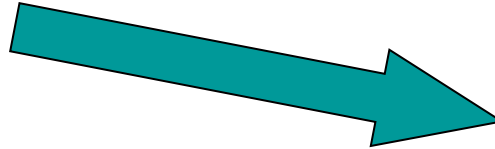


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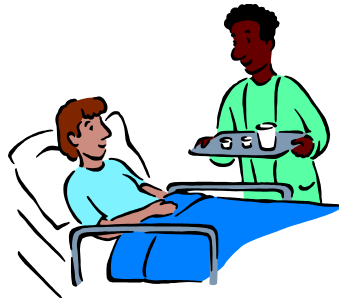
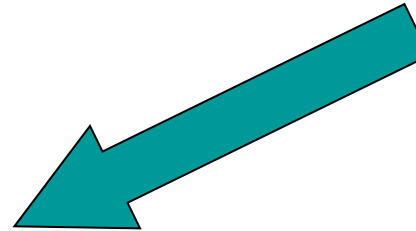
# One Piece Flow – One Touch



Physician examines  
patient & enters electronic  
order



Order  
filled



Order administered  
to patient



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# Signature Exercise

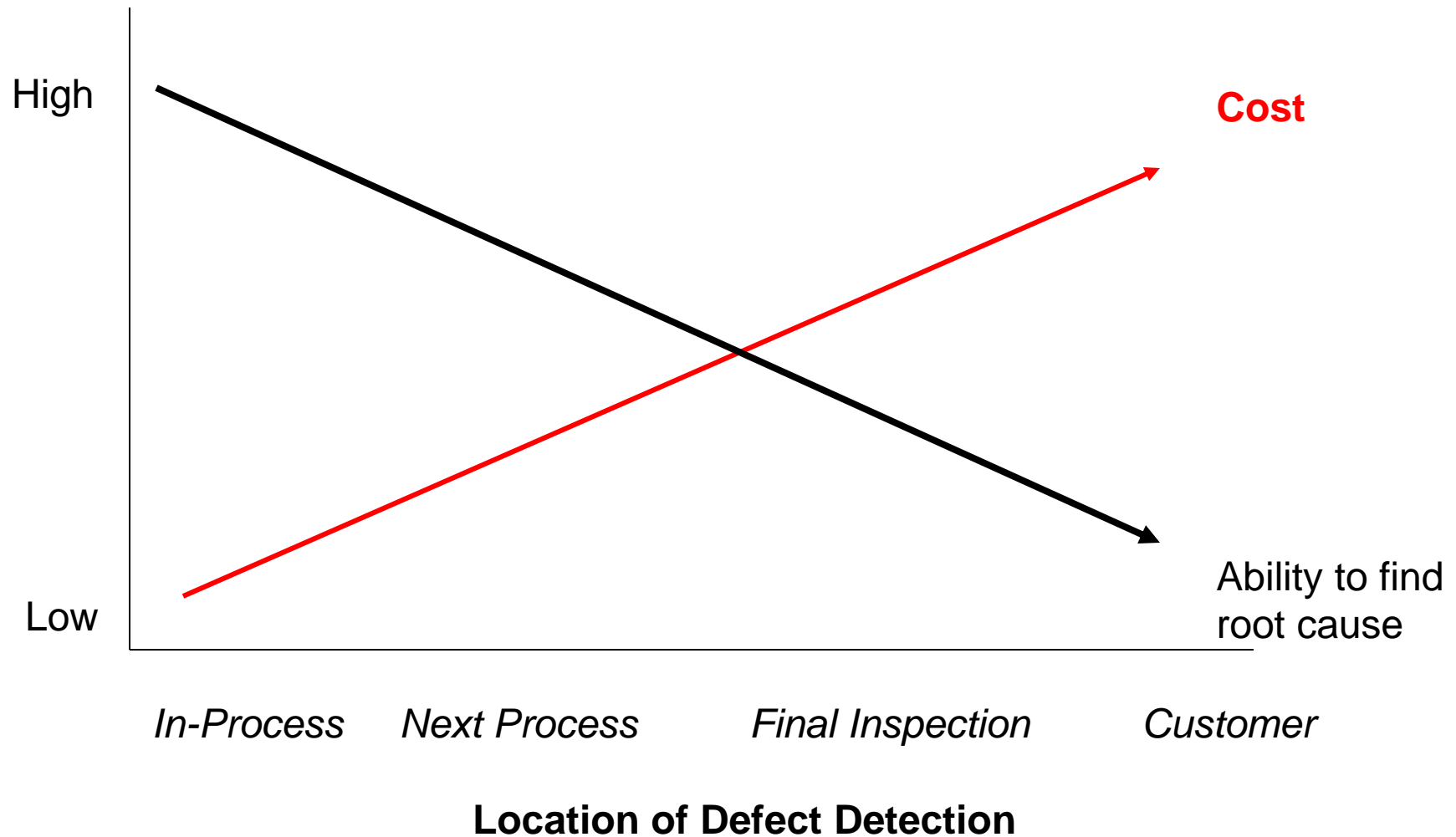
If one-piece flow is so superior, why is batching so prevalent?

Think river and rocks analogy (pg. 153 in Lean Hospitals)



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# Quality At The Source





# Signature Exercise Summary

## **Batch Environment:**

- Batch processing creates a longer lead time
- Quality issues are buried in the batch and do not surface until after work is completed

## **One-piece Flow:**

- One piece flow processing significantly reduces lead time.
- Quality problems are identified close to the point of occurrence and are corrected at the point of occurrence.

# **Overview of the Lean In Daily Work Model**

**(also referred to as the LIT Model)**

## **UMHS' Standard Work for Daily Problem Solving**



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## The Lean In Daily Work Model: Standard Work for Daily Problem Solving

### Key Metrics: Define, Measure, & Display

\*Links to strategic deployment

### Routine Interactions to Identify Problems

\*Part of daily standard work

### Assessment of Problem Complexity

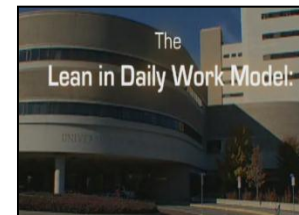
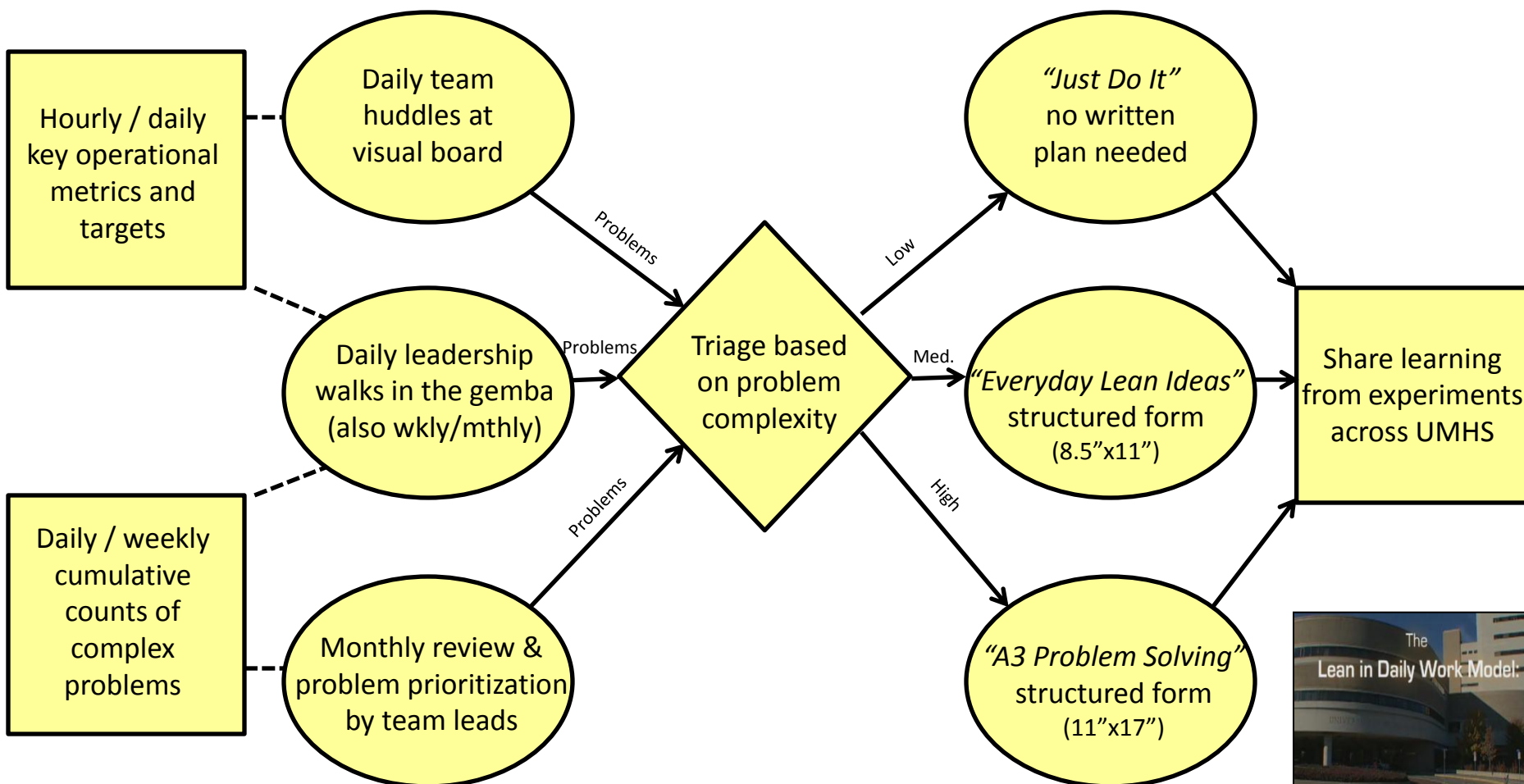
\*Takes place in the gemba

### Problem Solving Approaches

\*Design and run experiments

### Transfer Knowledge for Shared Learning

\*Share across organization



## Summary of the main Lean In Daily Work Elements

- Visual **Value Metrics**
- Daily **Team Huddles**
- Daily Problem Solving through the **Everyday Lean Idea Process**
- Daily & Weekly **Leadership Gemba Walks**
- Documenting Lean Solutions in **Confluence** for Knowledge Transfer
- Developing a **Visual Problem Prioritization Process**
- **Structured A3 Problem Solving** built into existing Team meetings

**LEADERSHIP N.**

*EMBEDDING THE CAPACITY FOR GREATNESS IN THE PEOPLE AND PRACTICES OF AN ORGANIZATION,  
AND DECOUPLING IT FROM THE PERSONALITY OF THE LEADER.*

Click for 9 minute video

## Key Measures of Success / Strategic Alignment

| Primary Goals                                 | Key Measures of Success  | UMHS Strategic Alignment   |
|---|--|--|
| Lean In Daily Work Process Sustained          | Monthly audits taking place in each Pilot area, surfacing necessary corrective actions | Sustaining Gains   |
| Continuous Problem Solving on Relevant Issues | 400+ Everyday Lean Ideas Implemented<br>(Many more in queue!!!)                        | People Development, Process Improvement, Service Excellence & Lateral Spread |
| Improvement & Sustaining of Value Metrics     | In excess of 80% Improvement to team's Value Metrics                                   | Strategic Deployment, Process Improvement & Service Excellence               |
| Improvement in Lean Culture Survey Score      | 51% Improvement In Overall Score<br>115% Improvement In "Willingness to Recommend"     | People Development & Service Excellence                                      |
| Mentoring / Evidence of Model Spread          | Yes -<br>Evidence of active Mentoring of new LIT areas                                 | Lateral Spread   |



# The Lean In Daily Work Model is a System

- Visual Metrics in the Absence of Team Huddles & Leadership Gemba Walks Quickly Becomes Wallpaper...



- Team Huddles & Leadership Gemba Walks in the Absence of Visual Metrics Quickly Becomes a Social Event...





## *Lean Enablers.....*

- Value / Non Value Add Exercise on your recurring meetings
  - Look for redundant meetings
  - Delegate for professional development
  - Remove when able
- Resources in Lean Thinking Confluence Folder:  
(<http://bit.ly/KsASq2>)
  - Lean Coach Office Hours (Two hours every week)
  - Lean Resources for Lean in Daily Work, Structured A3 Problem Solving, and Value Stream Mapping
  - Knowledge Transfer Repository



# *Questions / Comments*

## Contact Information:

Brendon Weil

Lean Coach, University of Michigan Health System

734-615-0175

[bweil@umich.edu](mailto:bweil@umich.edu)

Kevin DeHority

Lean Coach, University of Michigan Health System

734-615-0176

[dehority@umich.edu](mailto:dehority@umich.edu)



# YOUR TRAUMA REGISTRY AND THE INPUT OF QUALITY DATA: IT IS ESSENTIAL

Deanah Moore, RHIT  
Trauma Registrar Coding Specialist  
AOTR Secretary  
Mercy St.Vincent Medical Center and Mercy  
Children's Hospital  
Toledo, Ohio

# INTRODUCTION

- ▶ Personal
  - ▶ Registered Health Information Technician (RHIT)
  - ▶ Trauma Registrar Coding Specialist – 7 years
- ▶ Alliance of Ohio Trauma Registrars
  - ▶ Secretary
  - ▶ Member since 2007



# INTRODUCTION CONTINUED

- ▶ **Mercy St. Vincent Medical Center, Toledo Ohio**
  - ▶ Verified Level I Trauma Center
  - ▶ Approximately 1900 Trauma Patients per year
  - ▶ Member of Trauma Quality improvement program (TQIP)
    - ▶ Member since 2008
- ▶ **Trauma Department**
  - ▶ Staff
    - ▶ Medical Director
      - ▶ 5 core Trauma surgeons
    - ▶ Program Manager
    - ▶ 3 Trauma Nurse Coordinator's
    - ▶ 3 Full time Trauma Registrar Coding Specialists
    - ▶ 1 Full time Injury Prevention Coordinator



# EACH REGISTRAR IS RESPONSIBLE FOR QUALITY DATA IN YOUR REGISTRY



# QUALITY DATA

- ▶ A perception or an assessment of data's fitness to serve its purpose in a given context
- ▶ Aspects of data quality include:
  - ▶ Accuracy
  - ▶ Completeness
  - ▶ Relevance
  - ▶ Consistency across data sources
  - ▶ Validity
  - ▶ Timeliness
  - ▶ Detailed
  - ▶ Reliability
  - ▶ Appropriate presentation
  - ▶ Accessibility



# QUALITY DATA - WHAT DOES THAT MEAN FOR TRAUMA REGISTRIES?



- ▶ Accuracy
  - ▶ Data being correct
  - ▶ Free from error
  - ▶ Rate of 95%
- ▶ Completeness
  - ▶ Having all required fields completed and chart is complete
- ▶ Relevance
  - ▶ The fields that are being collected pertain to Trauma and improving care
- ▶ Consistency across data sources
  - ▶ Data collection is done the same and collected from the same location
    - ▶ Ex. Trauma Patient Arrival Time

# ED ARRIVAL TIME

## Trauma patient arrival time

- ▶ Used for Level one and Level two activation
- ▶ Trauma narrator is started before patient arrives to facility due to notification of patient arrival
- ▶ Nurse fills out specifically in Trauma Narrator in EHR when patient physically arrives
- ▶ Ex. 22:23

VS

## Patient arrival time

- ▶ On all patients
- ▶ Time patient arrived
- ▶ Completed when chart opens
- ▶ Ex. 22:11



ED LOS time difference of 12 minutes

# CONSISTENCY CONTINUED: DATA COLLECTION LOCATIONS AND INFORMATION CONSISTENT

- ▶ Paper and EHR
  - ▶ EMS Run sheets
    - ▶ Correct times
  - ▶ Specific data collected for higher level of trauma activations
    - ▶ Trauma Start Time/ Physician notified time
  - ▶ Inpatient Units
    - ▶ Time in Unit/ Time discharged from unit
  - ▶ Vitals
    - ▶ Specific time frames
  - ▶ Etc.





# QUALITY DATA - WHAT DOES THAT MEAN FOR TRAUMA REGISTRIES? (CONTINUED)

- ▶ Validity
  - ▶ Data collection needs to follow definitions
  - ▶ Data needs to be correct
- ▶ Timeliness
  - ▶ Data needs to be collected and completed for submission
- ▶ Detailed
  - ▶ Finding all data needed/required to have a complete chart. Especially for Coding/AIS.
  - ▶ Example: Humerus Fracture
  - ▶ Digging for the data
  - ▶ Google



# DATA DEFINITIONS – ENSURE CORRECT

- ▶ Need to review new changes that take place in each dictionary that you follow every year
  - ▶ Review NTDS/ TQIP – Chang Log
  - ▶ Review exact definition that change log referred to
  - ▶ Review every dictionary that you follow for changes that occurred

## CO-MORBID CONDITIONS



### Definition

Pre-existing co-morbid factors present before patient arrival at the ED/hospital.

### Field Values

- |  |   |
|--|---|
| 1. Other                                       | 16. History of angina within 30 days  |
| 2. Alcoholism                                  | 17. History of myocardial infarction  |
| 3. Ascites within 30 days                      | 18. History of PVD  |
| 4. Bleeding disorder                           | 19. Hypertension requiring medication   |
| 5. Currently receiving chemotherapy for cancer | 20. <del>RETIRE</del> 2012 Impaired sensorium                                     |
| 6. Congenital anomalies                        | 21. Prematurity   |
| 7. Congestive heart failure                    | 22. Obesity   |
| 8. Current smoker                              | 23. Respiratory disease   |
| 9. Chronic renal failure                       | 24. Steroid use   |
| 10. CVA/residual neurological deficit          | 25. Cirrhosis   |
| 11. Diabetes mellitus                          | 26. Dementia  |
| 12. Disseminated cancer                        | 27. Major psychiatric illness   |
| 13. Advanced directive limiting care           | 28. Drug or dependence  |
| 14. Esophageal varices                         | 29. Pre-hospital cardiac arrest with resuscitative efforts by healthcare provider |
| 15. Functionally dependent health status       |   |

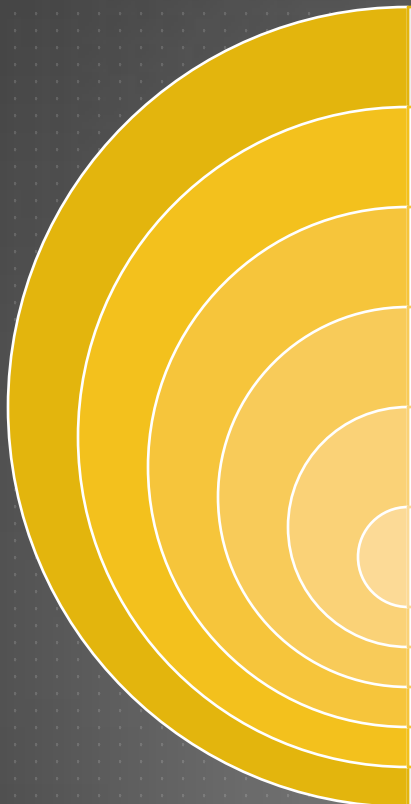
### Additional Information

- The null value "Not Applicable" is used for patients with no known co-morbid conditions.
- Refer to Appendix 3: Glossary of Terms for definition of Co-Morbid Conditions.
- Check all that apply.

# QUALITY DATA - WHAT DOES THAT MEAN FOR TRAUMA REGISTRIES? (CONTINUED)

- ▶ Reliability
  - ▶ Data entered in the registry is able to be trusted. We know that data is of high quality.
- ▶ Appropriate presentation
  - ▶ Able to be presented appropriately Ex. Graphs/ tables
  - ▶ Reports
  - ▶ Meeting purposes
- ▶ Accessibility
  - ▶ Data is able to be used/reported

# HOW TO MAKE SURE YOU HAVE QUALITY DATA IN YOUR TRAUMA REGISTRY



|  |
|--|
| <b>Follow Data Dictionary Definitions and your facilities rules</b>        |
| <b>Data collection locations and information consistent (Paper VS EHR)</b> |
| <b>Accurate</b>  |
| <b>Detailed</b>  |
| <b>Complete</b>  |
| <b>Validation</b>  |
|  |
|  |
|  |
|  |

# RISKS OF HAVING POOR DATA IN YOUR TRAUMA REGISTRY

## ► Risks

- Data could be misleading – Misrepresentation
  - Both Internal and External
- Poor data could result in inappropriate decision making across the institution
- Data could be considered “not reliable”
  - Rebuild trust
- Inaccurate
  - Could lead to improper reporting
  - Could affect Quality Improvement
  - Could affect Performance Improvement



# ANALYZING/ REVIEWING YOUR DATA

- ▶ Data analysis
  - ▶ The process of interpreting the meaning of the data we have collected, organized, and displayed in the form of a table, bar chart, line graph, or other representation.
  - ▶ Looking for patterns—similarities, disparities, trends, and other relationships—and thinking about what these patterns might mean
- ▶ Methods of data analysis
  - ▶ Charts/ Graphs
  - ▶ Reports
  - ▶ Spreadsheets



# ANALYZING YOUR DATA CONTINUED

- ▶ Comparison
  - ▶ Look for patterns, trends, outliers
  - ▶ Look for areas of concern and address them
- ▶ Ongoing
  - ▶ Monthly reporting at monthly Trauma meeting
  - ▶ Can breakdown how you prefer
    - ▶ Select appropriate timeframe Quarterly/ Monthly/ Yearly

# EXAMPLE OF WHAT CAN DISCOVER WHEN ANALYZE DATA

- ▶ LOS – ED/ ICU/ Total LOS - ? To long
- ▶ Complications - High number? How to improve? Low number? Collecting correctly? Share best practices
- ▶ ISS – Severity of patients treated - Enough staff for ICU?
- ▶ Volume – Enough staff for Trauma Department? Rest of hospital?
- ▶ Referring Facilities – Who is transferring to you?
- ▶ Mode of arrivals – Enough EMS and Air ambulance to service population if hospital houses a EMS/AIR agency
- ▶ Etc.....



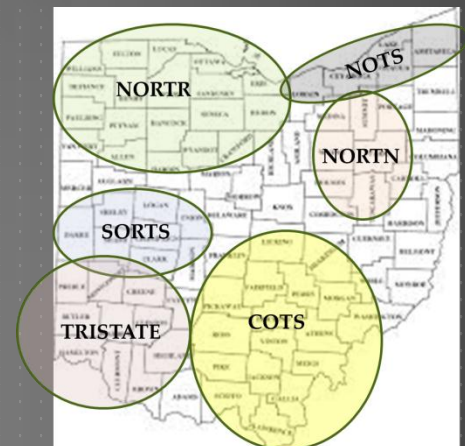
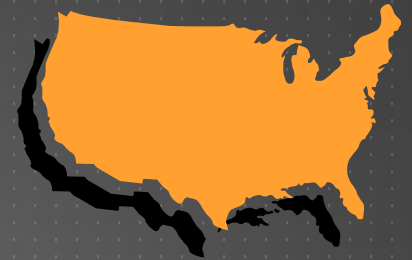
# OVERALL IMPORTANCE OF UNDERSTANDING YOUR DATA

- ▶ Quality Improvement
  - ▶ Systematic and continuous actions that lead to improvement in Trauma care for the injured patients
  - ▶ Continuous process to perform better
- ▶ Performance Improvement
  - ▶ Monitor/measure, evaluate and improve the performance of a trauma program.
  - ▶ Identify opportunities for improvement
  - ▶ Continuous process for improving care for the injured patient

Reference: *Resources for Optimal Care of the Injured Patient 2006* (). (2006). Performance Improvement and Patient Safety. Chicago: American College of Surgeons

# WHEN REPORTING TO NTDB,TQIP, STATE AND REGION

- ☐ Follow each Data Dictionary
- ☐ Submit data to each system
- ☐ Get updates from each system
- ☐ Receive reports from each system
  - Good benchmarking
- ☐ Research
- ☐ Each system can provide feedback regarding your data
  - External data validation



# REGIONAL TRAUMA REGISTRY

## **NORTR Board of Directors**

- Trauma Surgeons
- ER Physicians
- Trauma Program Managers
- Coroners office
- Pre- hospital
- Trauma Data Specialists

## **NORTR Staff**

### **Trauma Data Manager**

(Contract : on Avg. 50 hrs. month)

### **Program Assistant**

(.5 FTE with .25 of FTE for Trauma)

## **Member Hospitals**



# REGIONAL STAFF

## Trauma Data Manager

### ► Responsibilities

- Reviewing uploaded data
- Running edit checks
- Submitting data to State Registry
- Regional PI Reporting
- Research Projects
- Annual Report
- Working with vendor on Registry issues
- Providing Trauma Education
- Etc.....

## Trauma Program Assistant

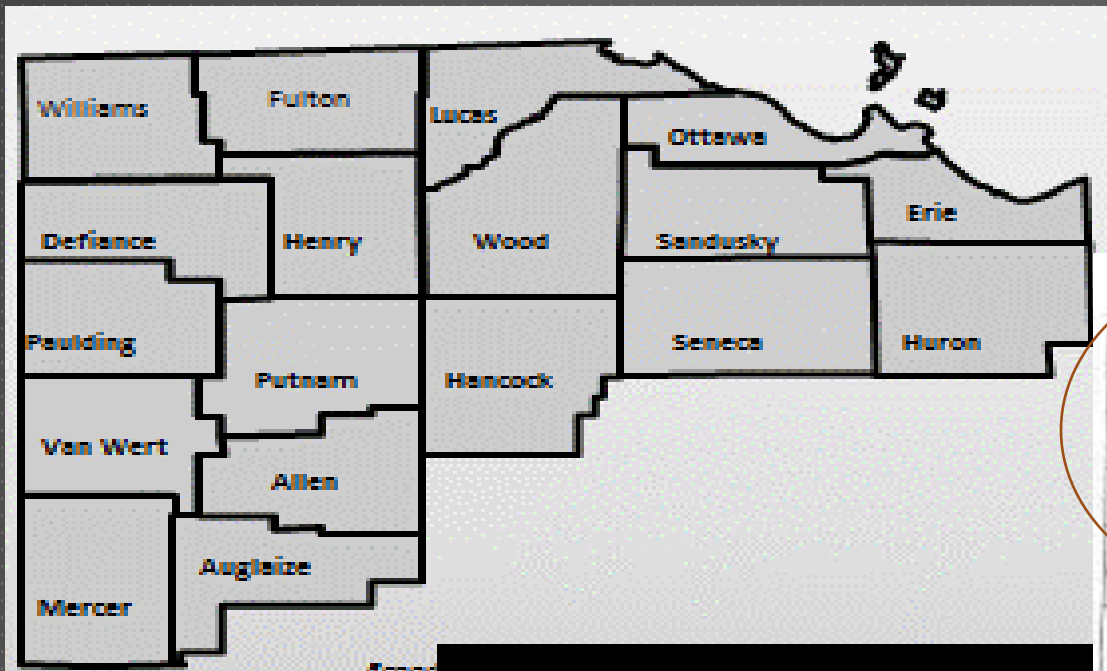
### ► Responsibilities

- Scheduling meetings
- Writing/distributing minutes
- Uploading trauma data from individual hospitals
- Coordinating annual conference

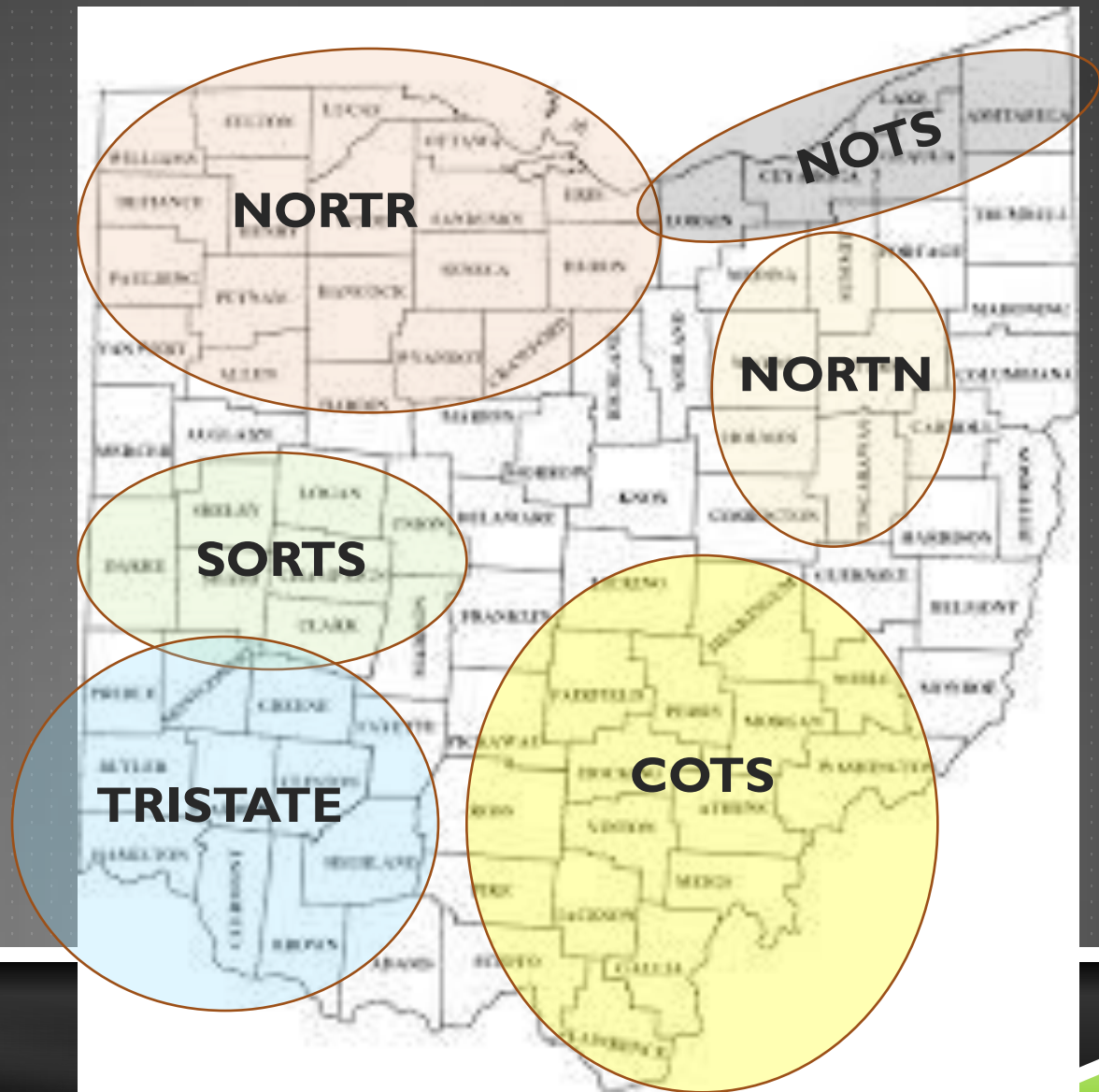
# NORTR

## Northwest Ohio Regional Trauma Registry

Houses 80,000  
records dating as  
far back as 1999

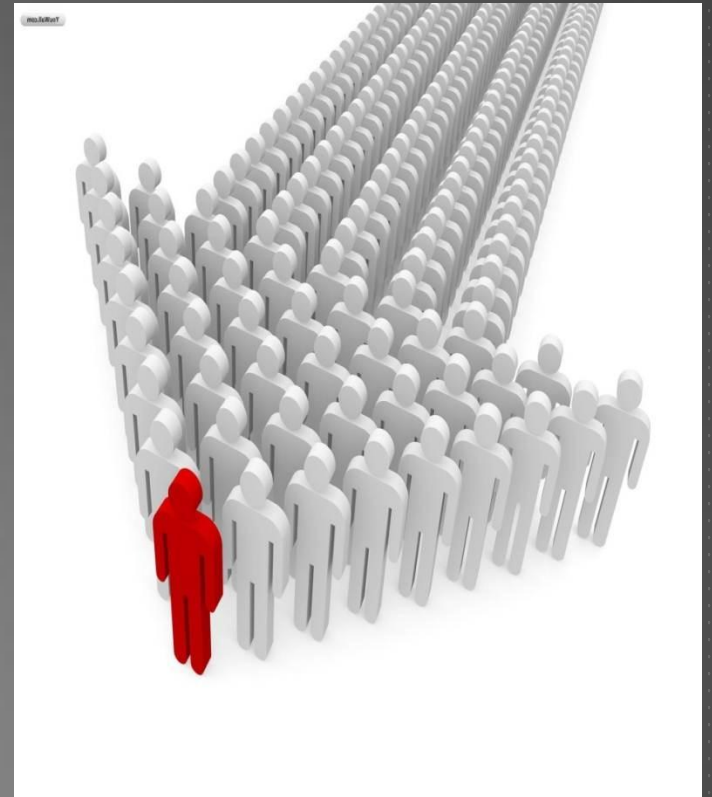


# Organized Regions In Ohio



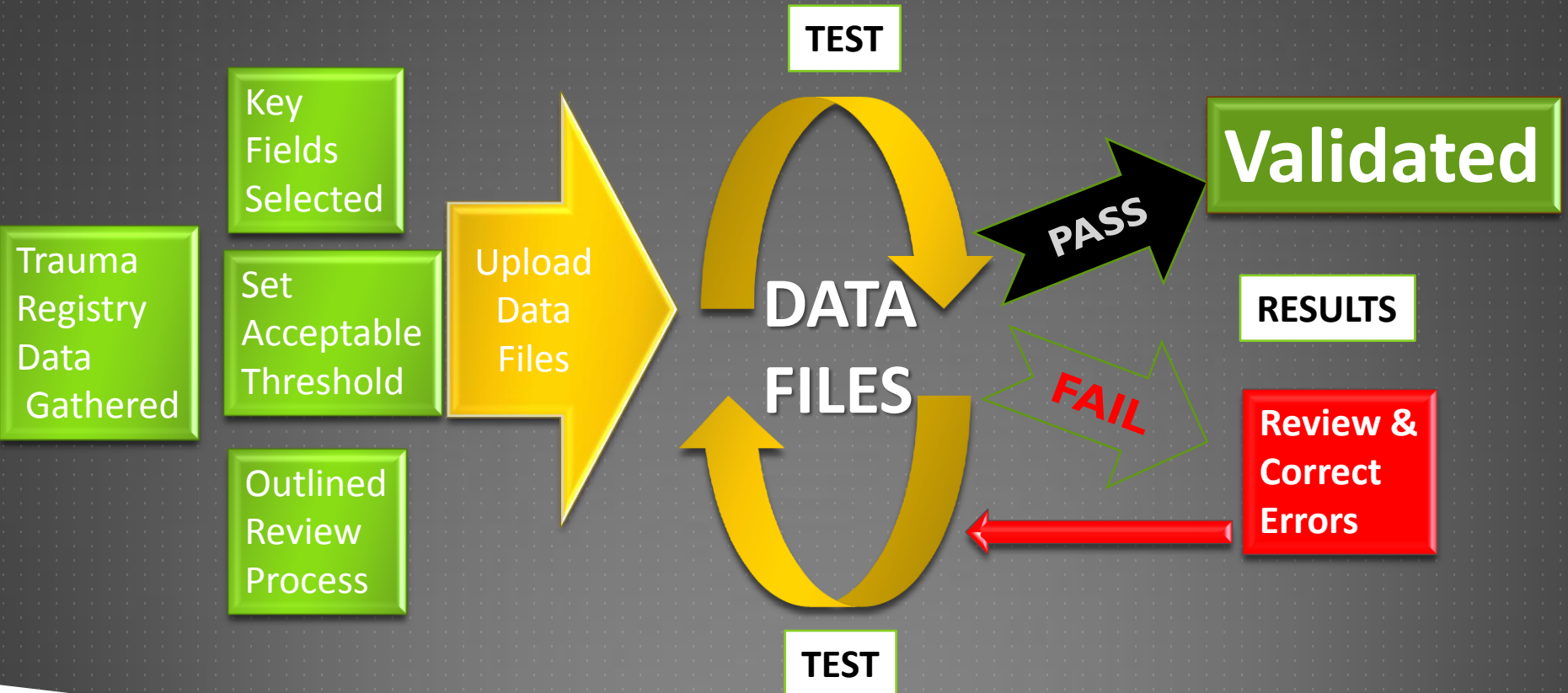
# LEADERSHIP

- ▶ Motivation
- ▶ Teamwork
- ▶ Planning
- ▶ Vision
- ▶ Critical Thinking
- ▶ Communication
- ▶ Courage & Risk
- ▶ Innovation
- ▶ Persistence





# TRAUMA DATA VALIDATION REGIONAL VIEW POINT





# RESULTS IDENTIFIED OF REGIONAL VALIDATION

- Additional and ongoing education
- Identifying injuries and writing a descriptive injury listing needed improvement
- AIS coding was weak in some facilities
- Data variables that were consistently entered with a null value were generally not prompted within the hospital's forms Ex. GCS components
- Too often generic values are entered instead of looking at the pick list for a more definitive value (i.e. using OTHER)
- Trauma registry software glitches

# EDUCATION PROVIDED FROM REGION

The Trauma Data Specialists involved with NORTR have continuing education opportunities including but not limited to:

- Regional Meetings
- Educational Offerings
- Newsletter
- Guest Speakers
- Practice Scenarios
- Data Review
- Webinars



# OHIO TRAUMA REGISTRY

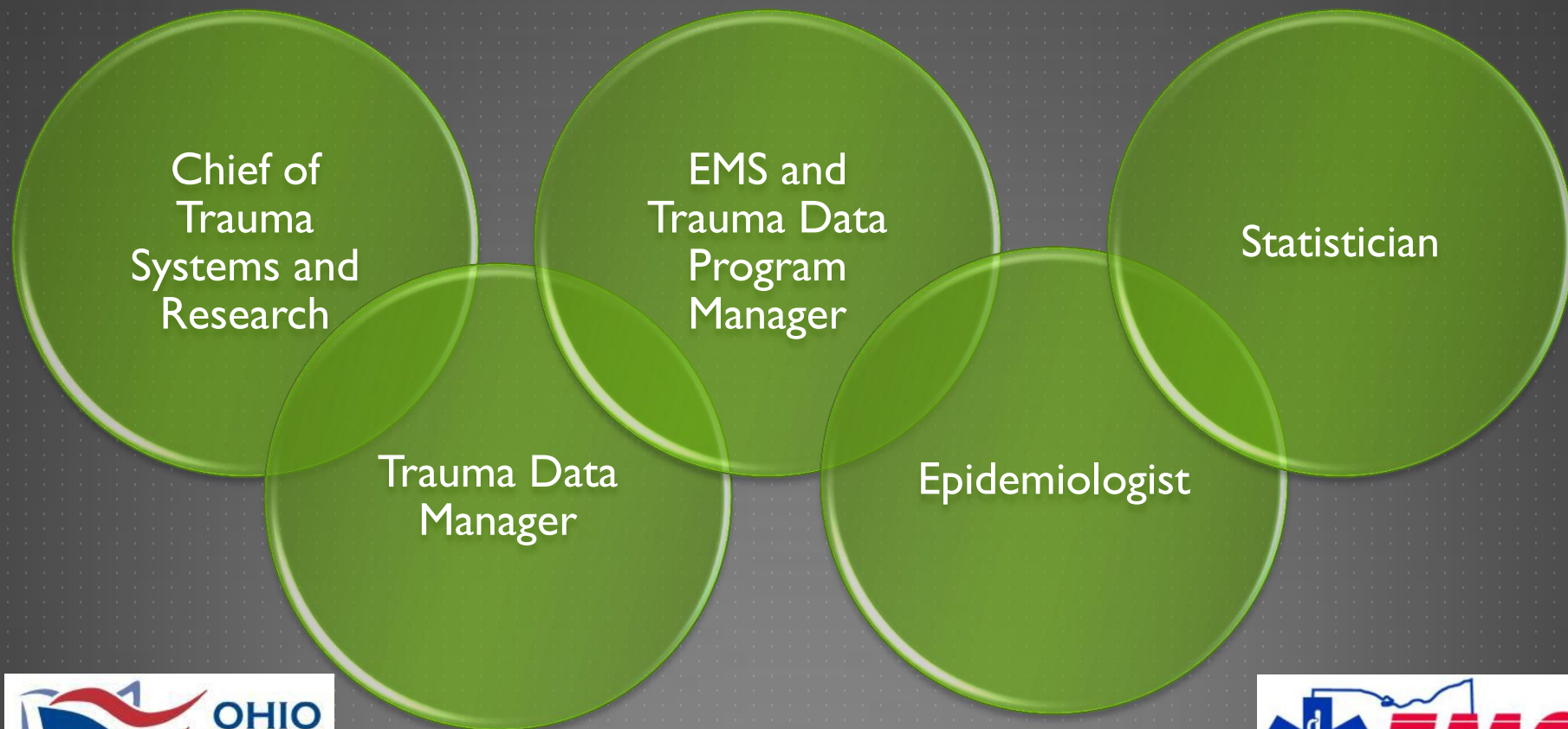


## ► Trauma Acute Care Registry

Ohio Trauma Registry was developed in 1997 and is housed within the Ohio Department of Public Safety, Division of EMS. Under the Ohio Revised Code 4765.06 (B) hospitals are required to report data on all trauma patients treated at their facility. Trauma patients are defined in the data dictionary's inclusion criteria. Data is received quarterly and reported on an annual basis. Upon request you can obtain data which can be used for a multitude of purposes including patient care initiatives and grant proposals.

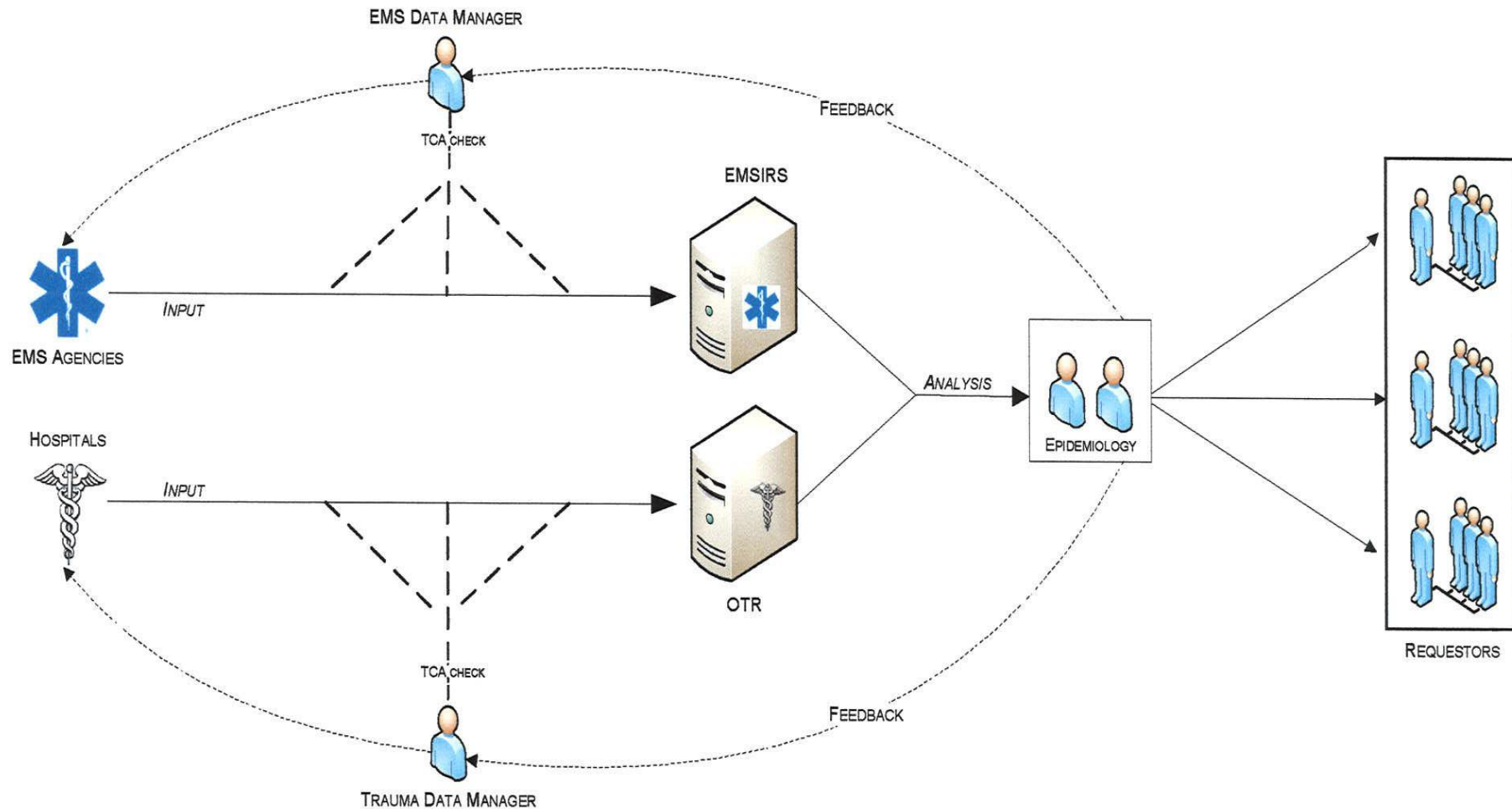


# STAFF FOR STATE REGISTRY



# EMS OFFICE OF RESEARCH & ANALYSIS

## DATA FLOW SCHEMA



# OHIO TRAUMA REGISTRY ARTICLES

## **Using Data Linkage to Assess the Impact of Motorized Recreational Vehicle-Related Injuries in Ohio**

KA Conner, H Xiang, JI Groner, GA Smith

*Journal of Safety Research* 39 (2008) 469–475

## **Level I Versus Level II Trauma Centers: An Outcomes-Based Assessment**

MT Cudnik, CD Newgard, MR Sayre, SM Steinberg

*Journal of Trauma*. 2009;66:1321–1326.

## **The Impact of a Standard Enforcement Safety Belt Law on Fatalities and Hospital Charges in Ohio**

KA Conner, H Xiang, GA Smith

*Journal of Safety Research* 41 (2010) 17-23

## **Development of Statewide Geriatric Patients Trauma Triage Criteria**

HA Werman, T Erskine, J Caterino, JF Riebe, T Valasek, Members of the Trauma Committee of the State of Ohio EMS Board  
*Prehospital & Disaster Medicine*, 2011;26(3):1–10.

## **Modification of Glasgow Coma Scale Criteria for Injured Elders**

JM Caterino, A Raubenolt, MT Cudnik

*Academic Emergency Medicine* 2011; 18:1014–1021

## **Substance Use and Type and Severity of Injury, Ohio, 2004-2007**

E Socie, RE Duffy, T Erskine

*Journal of Studies of Studies on Alcohol and Drugs*, 73, 260-267, 2012

# DATA DICTIONARIES STATE AND REGIONS

## NOTE:

- ▶ Initially did not follow NTDS
  - ▶ Made it complicated/cumbersome at certain points when collecting data fields
    - ▶ Ex. Would have same risk data with different definitions
- ▶ Currently do follow NTDS as of 2013
  - ▶ Made it much easier for facilities
  - ▶ Data more consistent



# ALLIANCE OF OHIO TRAUMA REGISTRARS (AOTR)



- ▶ Founded in 1992
- ▶ By Kathy Cookman, BS, CSTR, CAISS
- ▶ Purpose
  1. *To promote research and education in the trauma registry field.*
  2. *To provide assistance to registrars in their professional development.*
  3. *To actively participate in the continued development and preservation of the statewide trauma registry in Ohio.*
  4. *To encourage standardization among Ohio trauma registries.*



# AOTR CONTINUED

- ▶ Meet every other month
  - ▶ Discuss
    - ▶ Old Business
    - ▶ New Business
    - ▶ Provide an Educational Offering
    - ▶ Committees Report out
    - ▶ Open Forum/ Round Table



# NTDB HISTORY

- ▶ 1989 - Established
- ▶ 1995 - Original National Trauma Data Bank® Elements Defined
- ▶ 1997 - First call for data
- ▶ 1999 – Database analysis
- ▶ 2001 - First National Trauma Data Bank® Annual Report Released



Reference: History of the New Data Standard. (2008, December 4).. Retrieved May 16, 2014, from <http://www.ntdsdictionary.org/theNTDS/additionalInfo.html>

# WHAT NTDB OFFERS

- ▶ Provide assistance to state trauma managers and local hospitals
- ▶ Provide assistance to vendors
- ▶ Annual assessments of all hospital's capabilities
- ▶ Creation of reference documents
- ▶ Maintenance of the dataset
- ▶ Create compliance policies

# NTDB FOR TRAUMA REGISTRARS

- ▶ Annual adult and pediatric reports
- ▶ Google group
- ▶ Offer revision site
- ▶ Provide updated data dictionaries yearly
- ▶ The data we collect can be used for:
  - ▶ Developing Nationwide Trauma Benchmarks
  - ▶ Evaluating EMS, Hospital and Trauma Systems Patient Outcomes
  - ▶ Facilitating Research Efforts
  - ▶ Determining National Trends in Trauma Care
  - ▶ Addressing Resources for Disaster and Domestic Preparedness
  - ▶ Providing Valuable Information on Other Issues or Areas of Need Related to Trauma Care



# TRAUMA QUALITY IMPROVEMENT PROGRAM (TQIP)

- ▶ Offer for registrars specifically
  - ▶ Online quizzes – Monthly
  - ▶ TQIP Google Group
  - ▶ Conference calls
  - ▶ Online Training Course
  - ▶ Annual meeting
  - ▶ Reports



Reference: ACS TQIP Participation Guide: 2014 Program Year

# THE SUPPORT IS THERE

Education

Benchmarking

Networking



# REGISTRY BEST PRACTICES

- ▶ Staying in the know of the latest news and information coming from your region, state and national systems
- ▶ Maintain a change log
- ▶ Import data into Trauma Registry
- ▶ Using defaults in your system where appropriate
- ▶ Participating in educational opportunities
- ▶ Requesting missing data
- ▶ Communication



# BEST PRACTICES CONTINUED

- ▶ Completing updates provided by vendor
- ▶ Completing AIS Coding course
- ▶ Follow current version of data dictionaries
- ▶ Utilizing AIS code book not vendor provided codes
- ▶ Using 3M or Codebook for ICD-9 – not coders provided codes only
- ▶ Knowing your role(s)
- ▶ Data validation





# STAYING IN THE KNOW

- ▶ Google groups
- ▶ News letters
- ▶ Conferences/symposiums
- ▶ Meetings
- ▶ Emails
- ▶ Colleagues in the field



# CHANGE LOG EXAMPLE

## VITALS

September 2010- When documenting vitals and the first set of vitals does not have everything documented you may take the next vital documented if within 10 minutes.

6/28/2010 – O2 saturations- If no time documented when supplemental oxygen given put supplemental oxygen as = ND

If only one oxygen saturation is taken with no time then can use the documented saturation given as when vitals taken. DM (chart review)

4/5/2011- 30 minute window < or > 1 hour to capture 2<sup>nd</sup> set of hospital vitals.

10/31/12 – respiratory assistance includes everything but nasal cannula.  
Discussed in chart review.

4/23/12- 1<sup>st</sup> qtr 2013- per state/national/region. ½ hour time window for first set of vitals. Changed our ½ hr rule from 30 min pre and post hour to 15 minutes.

## COMPLICATIONS

5/27/2010- Updated complication list in TB to match complications that NP's collecting. Discussed w/ Jason. DM

## CRITIQUES

6/1/12- Started collecting burn weights.

Jan 1, 2013 – Stopped collecting burn weights.

4/1/2014- MEDICAL DEATH CRITIQUE ADDED

## PROVIDERS

02/28/2012- Changed OMF surgeons (Shall, Zeigler, Holdship, and Mayer) from DENT due to physicians request. Per Dave at CDM will pull previous charts without a problem.

10/31/12 - Observation= Finance = os, Adm svc. = other, adm. Physician = the admitting observation physician with trauma as a consult.

# IMPORTING DATA INTO REGISTRY

- ▶ Reduces data entry time
- ▶ Reduces opportunity for errors
- ▶ Always double check data that is imported



- ▶ Examples of fields:
  - ▶ MRN/PT #
  - ▶ First name/last name/ MI
  - ▶ Demographics
  - ▶ Date/ Time of injury
  - ▶ Chief complaint
  - ▶ Cause of injury
  - ▶ Admit date/arrival time
  - ▶ Vitals- initial
  - ▶ Initial Height/ Weight
  - ▶ Charges – MDC/ DRG/ Insurance/ total charges

# DEFAULTS

- ▶ Country – USA
  - ▶ Alternate home – NA
  - ▶ Work Related – N
  - ▶ Abuse reported – N
  - ▶ Airbag – NA
  - ▶ Child restraint – NA
  - ▶ EMS Triage - NOT
  - ▶ Height Units collected – IN/CM
  - ▶ Weight units collected – P/K
  - ▶ TQIP information
- 

ND

# REQUESTING MISSING DATA

ND

- ▶ Runsheets
  - ▶ Scene or Transfers
  - ▶ Maintain a list of fax numbers for local EMS agencies that would transfer your patients
- ▶ Referring hospital documents
  - ▶ Maintain a list of fax numbers for area hospitals that transfer patients to you

UNK

UNK

ND

REQUEST IT , REQUEST IT, REQUEST IT

ND

UNK

# SOFTWARE VS BOOK FOR AIS CODING

- ▶ Diagnoses: Left orbital roof fracture, closed

Note: Without CSF leak

- ▶ Software provided description/code:

Orbital fracture, closed or NFS – 251200.2

- ▶ AIS book description/code:

Rule: Code orbital roof under skull base

Base (basilar fracture) without CSF leak – I50202.3

# SOFTWARE VS BOOK FOR AIS CODING

- ▶ Diagnoses: L3 Transverse process fracture and 30% anterior wedge compression fracture

- ▶ Software provided description/code:

Multiple fractures of the same vertebrae: 650617.2

- ▶ AIS book description/code:

Exception: Major Compression Fractures which is coded additionally

Transverse Process fracture: 650620.2

30% anterior wedge compression fracture: 650634.3

# DATA VALIDITY

- ▶ Data validity – The data entered into the Trauma registry is a true representation of what the trauma registrar has abstracted and is claiming to measure
- ▶ “Collecting accurate and useful data is the most important aspect of Data validity”
- ▶ Purpose
  - ▶ Data is precise
  - ▶ Meets Criteria
  - ▶ Follow Definitions
  - ▶ Complete
  - ▶ Correct

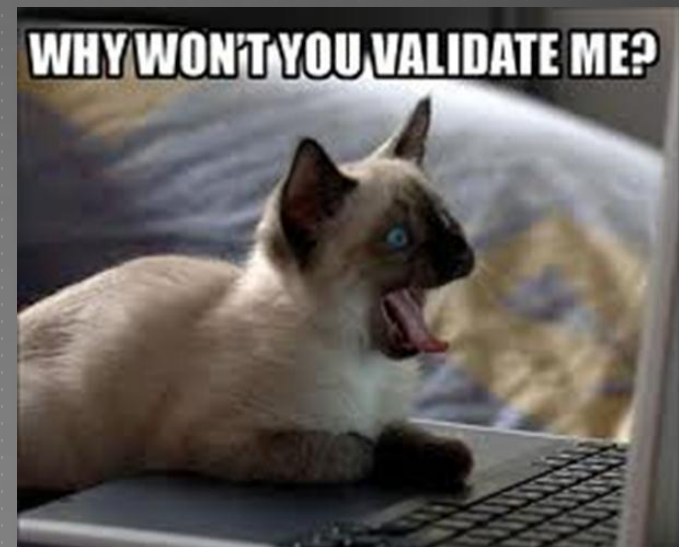


Reference: *Alliance of Ohio Trauma Registrars Resource Manual* (). (2013). Data Integrity and Validation. :Alliance of Ohio Trauma Registrars.



# VALIDATION OF YOUR DATA

- ▶ Referencing Green Book
  - ▶ The information provided by a trauma registry is only as valid as the data entered
- ▶ Validation – 5% - 10%
  - ▶ Essential
  - ▶ Ongoing
  - ▶ Different approaches
  - ▶ Can not rely on only software tools
  - ▶ Can be done by different staff if needed
  - ▶ Need to have a process in place



Reference: *Resources for Optimal Care of the Injured Patient 2006*. (2006). Trauma Registry. Chicago: American College of Surgeons

# CHOOSE/CREATE YOUR FACILITIES VALIDATION PLAN/PROCESS



- ▶ Review previously completed month
- ▶ Select charts randomly or can choose specifically (ex. Deaths, transfers etc.)
- ▶ Select fields to review
  - ▶ Can choose primary fields, variety, groups of fields or all fields
- ▶ Review individually then as a group
  - ▶ If single registrar can have manager review
- ▶ Can create field in registry for monitoring – Easy for report running
  - ▶ Chart validated? Yes
  - ▶ Date validated
  - ▶ Validated by
- ▶ Create spreadsheet for validation
- ▶ Validation tracking sheet

**\*\*\*\* Don't forget to also  
review your  
validator reports\*\*\*\***

# VALIDATION TRACKING SHEET

| MVSMC TRAUMA REGISTRY DATA VALIDATION - 2014 |                            |                              |                                  |
|--|----------------------------|------------------------------|----------------------------------|
| MONTH VALIDATED                              | PARTICIPATED IN<br>REVIEWS | NUMBER OF CHARTS<br>REVIEWED | DATE CHARTS REVIEWED AS<br>GROUP |
|  |                            |                              |                                  |
| JANUARY                                      |                            |                              |                                  |
| FEBRUARY                                     |                            |                              |                                  |
| MARCH  |                            |                              |                                  |
| APRIL  |                            |                              |                                  |
| MAY  |                            |                              |                                  |
| JUNE   |                            |                              |                                  |
| JULY   |                            |                              |                                  |
| AUGUST                                       |                            |                              |                                  |
| SEPTEMBER                                    |                            |                              |                                  |
| OCTOBER                                      |                            |                              |                                  |
| NOVEMBER                                     |                            |                              |                                  |
| DECEMBER                                     |                            |                              |                                  |

# CHART VALIDATION EXAMPLE

|                            |                    |                           |                       |            |                   |                         |
|----------------------------|--------------------|---------------------------|-----------------------|------------|-------------------|-------------------------|
| REGISTRAR:                 |                    |                           | 2014 CHART REVIEW     |            |                   |                         |
| PATIENT NAME:              |                    | AUDITOR:                  |                       |            |                   |                         |
| MRN:                       |                    | MONTH PATIENT DISCHARGED: |                       |            |                   |                         |
| PT #:                      |                    |                           |                       |            |                   |                         |
| TRAUMA #:                  |                    |                           |                       |            |                   |                         |
| DATA ELEMENT               | CHECK IF INCORRECT | WHAT ABTRACTOR HAD        | WHY AUDITOR DISAGREES | CHANGES TO | CHANGES COMPLETED | ABTRACTOR INITIALS/DATE |
| PROVIDERS                  |                    |                           |                       |            |                   |                         |
| ADMITTING DOCTOR           |                    |                           |                       |            |                   |                         |
| ADMITTING DOCTOR SERVICE   |                    |                           |                       |            |                   |                         |
| TRAUMA SURGEON             |                    |                           |                       |            |                   |                         |
| ED ATTENDING               |                    |                           |                       |            |                   |                         |
| TIME SURGEON NOTIFIED      |                    |                           |                       |            |                   |                         |
| DATE SURGEON NOTIFIED      |                    |                           |                       |            |                   |                         |
| TIME SURGEON ARRIVED AT ER |                    |                           |                       |            |                   |                         |
| DATE SURGEON ARRIVED AT ER |                    |                           |                       |            |                   |                         |
| PHYSICIAN #                |                    |                           |                       |            |                   |                         |
| SERVICE OF PROVIDER        |                    |                           |                       |            |                   |                         |
| PHYSICIAN #                |                    |                           |                       |            |                   |                         |
| SERVICE OF PROVIDER        |                    |                           |                       |            |                   |                         |
| VITALS                     |                    |                           |                       |            |                   |                         |
| SCENE                      |                    |                           |                       |            |                   |                         |
| PULSE                      |                    |                           |                       |            |                   |                         |
| RESPIRATION RATE           |                    |                           |                       |            |                   |                         |
| SYSTOLIC BLOOD PRESSURE    |                    |                           |                       |            |                   |                         |
| GCS EYE                    |                    |                           |                       |            |                   |                         |
| GCS VERBAL                 |                    |                           |                       |            |                   |                         |
| GCS MOTOR                  |                    |                           |                       |            |                   |                         |
| GCS TOTAL                  |                    |                           |                       |            |                   |                         |

# WHY WE LOVE BEING TRAUMA REGISTRARS!



- ▶ Contributing to the Improvement of care provided to Trauma patients
- ▶ Being a detective
- ▶ Always a new story. You never know what the next chart will be about



# REFERENCES

- ▶ ACS NTDB National Trauma Data Standard: Data Dictionary. 2014 Admissions
- ▶ AOTR about us. (2013, January 7).. Retrieved May 16, 2014, from <http://www.ohiotraumaregistrars.org/about.htm>
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- ▶ Data Quality and Data Quality Assurance Policy. (2011, March 3).. Retrieved May 13, 2014, from [http://www.admin.ox.ac.uk/pras/aboutus/data\\_quality/](http://www.admin.ox.ac.uk/pras/aboutus/data_quality/)
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# REFERENCES

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- ▶ <https://www.teachervision.com/skill-builder/graphs-and-charts/48946.html>
- ▶ Kathy Cookman, NORTR Trauma Data Manager, 2014, May
- ▶ *Resources for Optimal Care of the Injured Patient 2006*. (2006). Performance Improvement and Patient Safety. Chicago: American College of Surgeons
- ▶ *Resources for Optimal Care of the Injured Patient 2006*. (2006). Trauma Registry. Chicago: American College of Surgeons
- ▶ Rouse, M. (2005, November 4). Data Quality. . Retrieved May 13, 2014, from <http://searchdatamanagement.techtarget.com/definition/data-quality>
- ▶ Timothy Erskine, Chief of Trauma Systems and Research, 2014, May

# **Confidentiality Agreement**

**Jill Jakubus, PA-C**





# Confidentiality Agreement

- ◆ Everyone signs a confidentiality agreement for entry to the meeting
- ◆ Every meeting
- ◆ No photos
- ◆ Reports distributed at the end of the meeting

# Confidentiality Agreement

The following examples are to be considered privileged and confidential information and should be discussed only within the confines of the MTQIP Quality Collaborative meetings.

- ◆ Any and all patient information.
- ◆ Any and all patient identifiers which are considered privileged and protected health information as defined by current HIPPA laws.
- ◆ Any specific Michigan trauma case information.
- ◆ Any information discussed regarding a specific MTQIP site outcome.
- ◆ Any reference to a specific MTQIP site result or analysis.
- ◆ All trauma data presented including but not limited to Composite Metrics.

# **Confidentiality Agreement**

By signing this document, I agree to protect the confidentiality of all information discussed at this meeting and take steps to safeguard against any disclosure of privileged information that may have been discussed. I understand that any violation of confidentiality may result in my personal removal from participation in the project as well as the removal of the hospital site I represent.

# Hospital Metrics



# MTQIP 2014 Hospital Metrics

- ◆ Participation 70%
  - Data Submission
  - Surgeon Lead
  - Trauma Program Manager/Registrar
  - Site specific QI project
  - Presentation/Use of MTQIP data
- ◆ Performance 30%
  - Data Validation
  - Massive Transfusion Protocol
  - VTE Prophylaxis

| 2014 MTQIP Hospital Metrics |        |   |                                      |                              |
|-----------------------------|--------|---|--------------------------------------|------------------------------|
| Measure                     | Weight | Measure Description   | Points<br>(Existing<br>Participants) | Points<br>(New Participants) |
| PARTICIPATION (70%)         |        |   |                                      |                              |
| #1                          | 10     | <b>Data Submission</b>  |                                      |                              |
|                             |        | On time 3 of 3 times  | 10                                   | 10                           |
|                             |        | On time 2 of 3 times  | 5                                    | 5                            |
|                             |        | On time 1 of 3 times  | 0                                    | 0                            |
| #2                          | 20     | <b>Meeting Participation – Surgeon Lead</b>                     |                                      |                              |
|                             |        | Participated in 3 of 3 meetings                                 | 20                                   | 20                           |
|                             |        | Participated in 2 of 3 meetings                                 | 10                                   | 10                           |
|                             |        | Participated in 1 of 3 meetings                                 | 5                                    | 5                            |
|                             |        | No participation  | 0                                    | 0                            |
| #3                          | 20     | <b>Meeting Participation – Trauma Manager/Registrar (Avg)</b>   |                                      |                              |
|                             |        | Participated in 3 of 3 meetings                                 | 20                                   | 20                           |
|                             |        | Participated in 2 of 3 meetings                                 | 10                                   | 10                           |
|                             |        | Participated in 1 of 3 meetings                                 | 5                                    | 5                            |
|                             |        | No participation  | 0                                    | 0                            |
| #4                          | 10     | <b>Site Specific Quality Improvement Project Implementation</b> |                                      |                              |
|                             |        | Project data submitted  | 10                                   | 10                           |
|                             |        | Project data not submitted                                      | 0                                    | 0                            |
| #5                          | 10     | <b>Surgeon Lead Presents MTQIP Reports at Hospital Meetings</b> |                                      |                              |
|                             |        | Presented at 3 meetings   | 10                                   | 10                           |
|                             |        | Presented at 2 meetings   | 8                                    | 8                            |
|                             |        | Presented at 1 meeting  | 5                                    | 5                            |
|                             |        | Did not present   | 0                                    | 0                            |
|                             |        | *Signed attestation required                                    |                                      |                              |

| PERFORMANCE (30%) |    |   |          |                  |     |    |
|-------------------|----|---|----------|------------------|-----|----|
| #6                | 10 | Accuracy of Data  |          |                  |     | na |
|                   |    |   | Visit #1 | Visit #2 or More |     |    |
|                   |    | 5 star validation   | 0-4.5%   | 0-4.5%           | 10  |    |
|                   |    | 4 star validation   | 4.6-5.5% | 4.6-5.5%         | 8   |    |
|                   |    | 3 star validation   | 5.6-8.0% | 5.6-7.0%         | 5   |    |
|                   |    | 2 star validation   | 8.1-9.0% | 7.1-8.0%         | 3   |    |
|                   |    | 1 star validation   | > 9%     | > 8.0%           | 0   |    |
| #7                | 10 | Massive Transfusion (defined as ≥ 4 u PRBC in first 4 hours):<br>Mean PRBC to Plasma Ratio for first 4 hours of admission |          |                  |     | na |
|                   |    | ≤ 1.5   |          |                  | 10  |    |
|                   |    | 1.6 - 2.5   |          |                  | 7.5 |    |
|                   |    | > 2.5   |          |                  | 5   |    |
|                   |    | > 3.0   |          |                  | 0   |    |
| #8                | 10 | Timely VTE Prophylaxis (< 48 hours of admission)  |          |                  |     | na |
|                   |    | > 50%   |          |                  | 10  |    |
|                   |    | ≥ 40%   |          |                  | 5   |    |
|                   |    | < 40%   |          |                  | 0   |    |

# Graph Refresher

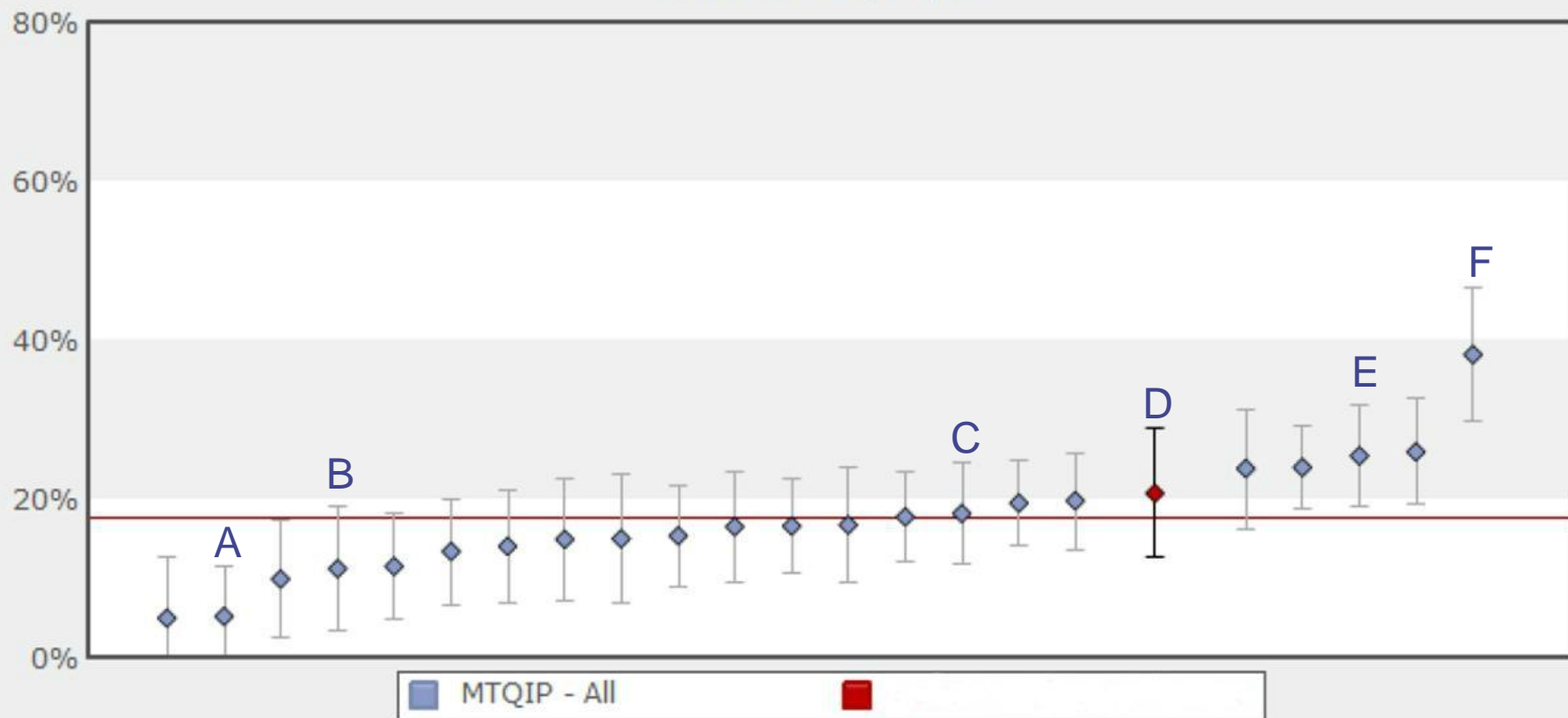




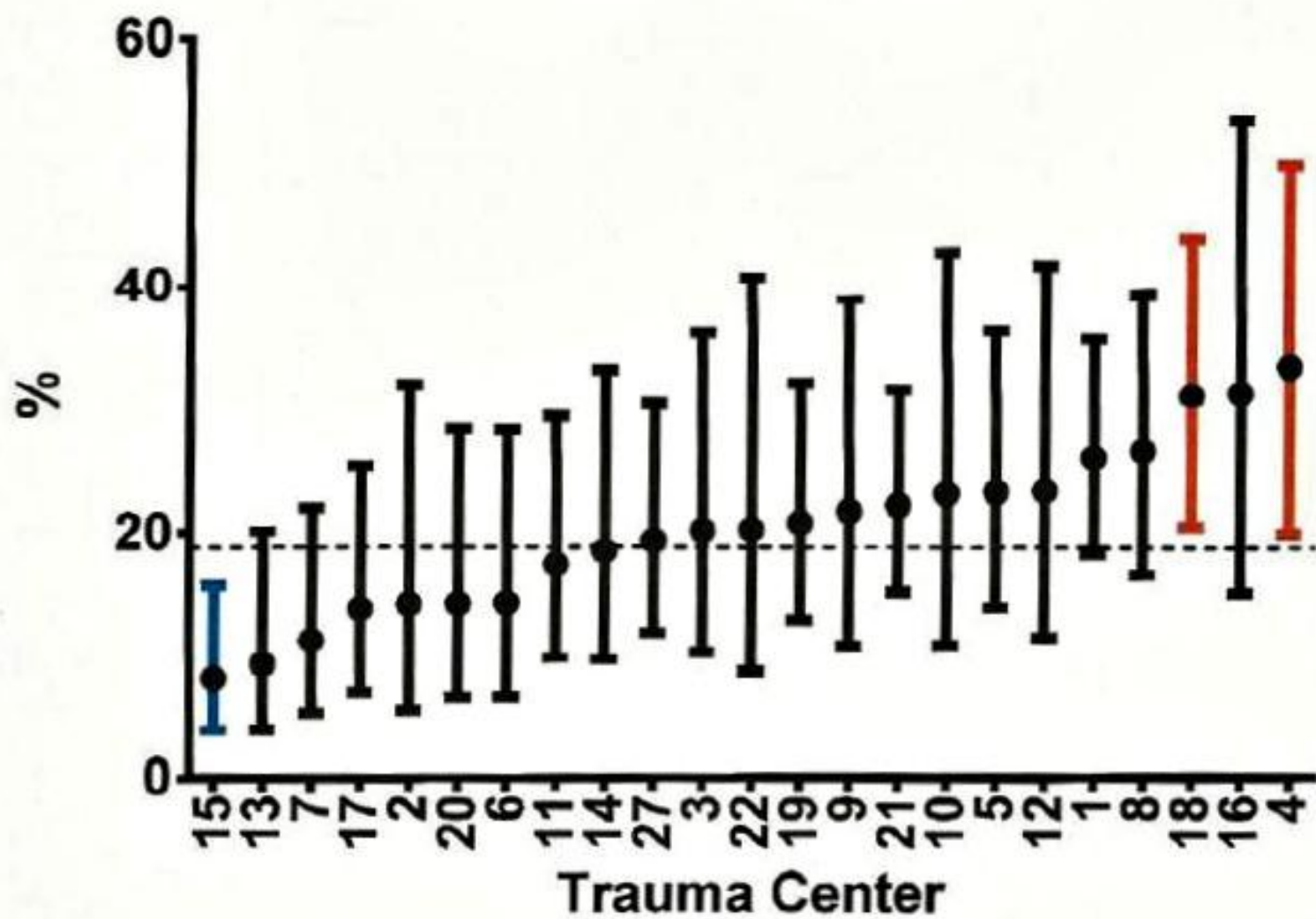
## Outcomes Overview - Failure to Rescue

Provider:

Period: 11/01/2011 - 10/31/2012, Peer Group: MTQIP - All,  
Report Date: 12/20/2013



## Failure to Rescue



# Collaborative Metrics



# Center Acronyms

|                                |    |
|--------------------------------|----|
| Borgess                        | BO |
| Botsford                       | BF |
| Bronson                        | BM |
| Covenant                       | CO |
| Detroit Receiving              | DR |
| Genesys                        | GH |
| Henry Ford Detroit             | HF |
| Henry Ford Macomb              | HM |
| Hurley                         | HU |
| Marquette General              | MG |
| McLaren Macomb                 | MC |
| McLaren Lapeer                 | ML |
| McLaren Pontiac                | PO |
| Munson                         | MU |
| Oakwood Dearborn               | OW |
| Oakwood Southshore             | OS |
| Sinai Grace                    | SG |
| Sparrow                        | SP |
| Spectrum Health                | SH |
| St. John                       | JO |
| St. Joseph Mercy Ann Arbor     | SJ |
| St. Joseph Mercy Oakland       | SO |
| St. Marys Mercy (Grand Rapids) | MM |
| St. Marys Michigan (Saginaw)   | SM |
| U of M                         | UM |
| William Beaumont               | WB |

**Blood Products (7/1/12 to 6/30/13)****Inclusion:****PRBC 4hrs  $\geq$  4 units**

| <u>Trauma Center</u> | <u>N Patients</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs <math>\leq</math> 3</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs <math>\leq</math> 2.5</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs <math>\leq</math> 1.5</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>24 hrs</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>24 hrs <math>\leq</math> 2.0</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>24 hrs <math>\leq</math> 1.5</u> | <u>Dead</u> |
|----------------------|-------------------|---|---|---|---|--|--|--|-------------|
| 19                   | 6                 | 1.1   | 2   | 2   | 2   | 1.2  | 3  | 3  | 2           |
| 18                   | 11                | 1.2   | 11  | 11  | 10  | 1.1  | 11   | 11   | 5           |
| 17                   | 7                 | 1.3   | 6   | 5   | 5   | 1.3  | 5  | 5  | 3           |
| 2                    | 1                 | 1.3   | 1   | 1   | 1   | 1.5  | 1  | 1  | 0           |
| 3                    | 5                 | 1.4   | 5   | 5   | 4   | 1.5  | 4  | 3  | 1           |
| 27                   | 9                 | 1.4   | 6   | 5   | 5   | 1.1  | 5  | 5  | 3           |
| 22                   | 1                 | 1.7   | 1   | 1   | 0   | 3.3  | 0  | 0  | 1           |
| 4                    | 5                 | 1.8   | 3   | 2   | 1   | 1.8  | 2  | 1  | 4           |
| 21                   | 16                | 2.0   | 10  | 8   | 5   | 1.9  | 8  | 4  | 8           |
| 6                    | 1                 | 2.0   | 1   | 1   | 0   | 1.4  | 1  | 1  | 1           |
| 10                   | 13                | 2.1   | 9   | 9   | 7   | 1.6  | 10   | 8  | 1           |
| 13                   | 5                 | 2.1   | 3   | 3   | 2   | 1.5  | 3  | 2  | 0           |
| 16                   | 4                 | 2.1   | 2   | 2   | 0   | 2.0  | 1  | 0  | 2           |
| 14                   | 6                 | 2.2   | 3   | 3   | 1   | 2.3  | 2  | 1  | 5           |
| 11                   | 10                | 2.3   | 6   | 6   | 3   | 2.1  | 6  | 3  | 6           |
| 15                   | 16                | 2.6   | 9   | 8   | 2   | 2.1  | 9  | 6  | 4           |
| 1                    | 9                 | 2.8   | 4   | 4   | 3   | 2.6  | 5  | 3  | 5           |
| 7                    | 9                 | 2.8   | 5   | 5   | 1   | 1.9  | 4  | 3  | 2           |
| 8                    | 1                 | 3.0   | 1   | 0   | 0   | 3.0  | 0  | 0  | 0           |
| 5                    | 2                 | 3.5   | 1   | 0   | 0   | 3.5  | 0  | 0  | 1           |
| 9                    | 1                 | --  | 0   | 0   | 0   | --   | 0  | 0  | 1           |
| 20                   | 2                 | --  | 0   | 0   | 0   | --   | 0  | 0  | 0           |
| Total                | 140               | 1.8   | 89  | 81  | 52  | 1.6  | 80   | 60   | 55          |

# Blood Products (7/1/12 to 6/30/13)

Inclusion:

PRBC 4hrs ≥ 4 units

| <u>Trauma Center</u> | <u>N Patients</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs ≤ 3</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs ≤ 2.5</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs ≤ 1.5</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>24 hrs</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>24 hrs ≤ 2.0</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>24 hrs ≤ 1.5</u> | <u>Dead</u> |
|----------------------|-------------------|---|---|---|---|--|--|--|-------------|
| 19                   | 6                 | 1.1   | 2   | 2   | 2   | 1.2  | 3  | 3  | 2           |
| 18                   | 11                | 1.2   | 11  | 11  | 10  | 1.1  | 11   | 11   | 5           |
| 17                   | 7                 | 1.3   | 6   | 5   | 5   | 1.3  | 5  | 5  | 3           |
| 2                    | 1                 | 1.3   | 1   | 1   | 1   | 1.5  | 1  | 1  | 0           |
| 3                    | 5                 | 1.4   | 5   | 5   | 4   | 1.5  | 4  | 3  | 1           |
| 27                   | 9                 | 1.4   | 6   | 5   | 5   | 1.1  | 5  | 5  | 3           |
| 22                   | 1                 | 1.7   | 1   | 1   | 0   | 3.3  | 0  | 0  | 1           |
| 4                    | 5                 | 1.8   | 3   | 2   | 1   | 1.8  | 2  | 1  | 4           |
| 21                   | 16                | 2.0   | 10  | 8   | 5   | 1.9  | 8  | 4  | 8           |
| 6                    | 1                 | 2.0   | 1   | 1   | 0   | 1.4  | 1  | 1  | 1           |
| 10                   | 13                | 2.1   | 9   | 9   | 7   | 1.6  | 10   | 8  | 1           |
| 13                   | 5                 | 2.1   | 3   | 3   | 2   | 1.5  | 3  | 2  | 0           |
| 16                   | 4                 | 2.1   | 2   | 2   | 0   | 2.0  | 1  | 0  | 2           |
| 14                   | 6                 | 2.2   | 3   | 3   | 1   | 2.3  | 2  | 1  | 5           |
| 11                   | 10                | 2.3   | 6   | 6   | 3   | 2.1  | 6  | 3  | 6           |
| 15                   | 16                | 2.6   | 9   | 8   | 2   | 2.1  | 9  | 6  | 4           |
| 1                    | 9                 | 2.8   | 4   | 4   | 3   | 2.6  | 5  | 3  | 5           |
| 7                    | 9                 | 2.8   | 5   | 5   | 1   | 1.9  | 4  | 3  | 2           |
| 8                    | 1                 | 3.0   | 1   | 0   | 0   | 3.0  | 0  | 0  | 0           |
| 5                    | 2                 | 3.5   | 1   | 0   | 0   | 3.5  | 0  | 0  | 1           |
| 9                    | 1                 | --  | 0   | 0   | 0   | --   | 0  | 0  | 1           |
| 20                   | 2                 | --  | 0   | 0   | 0   | --   | 0  | 0  | 0           |
| Total                | 140               | 1.8   | 89  | 81  | 52  | 1.6  | 80   | 60   | 55          |

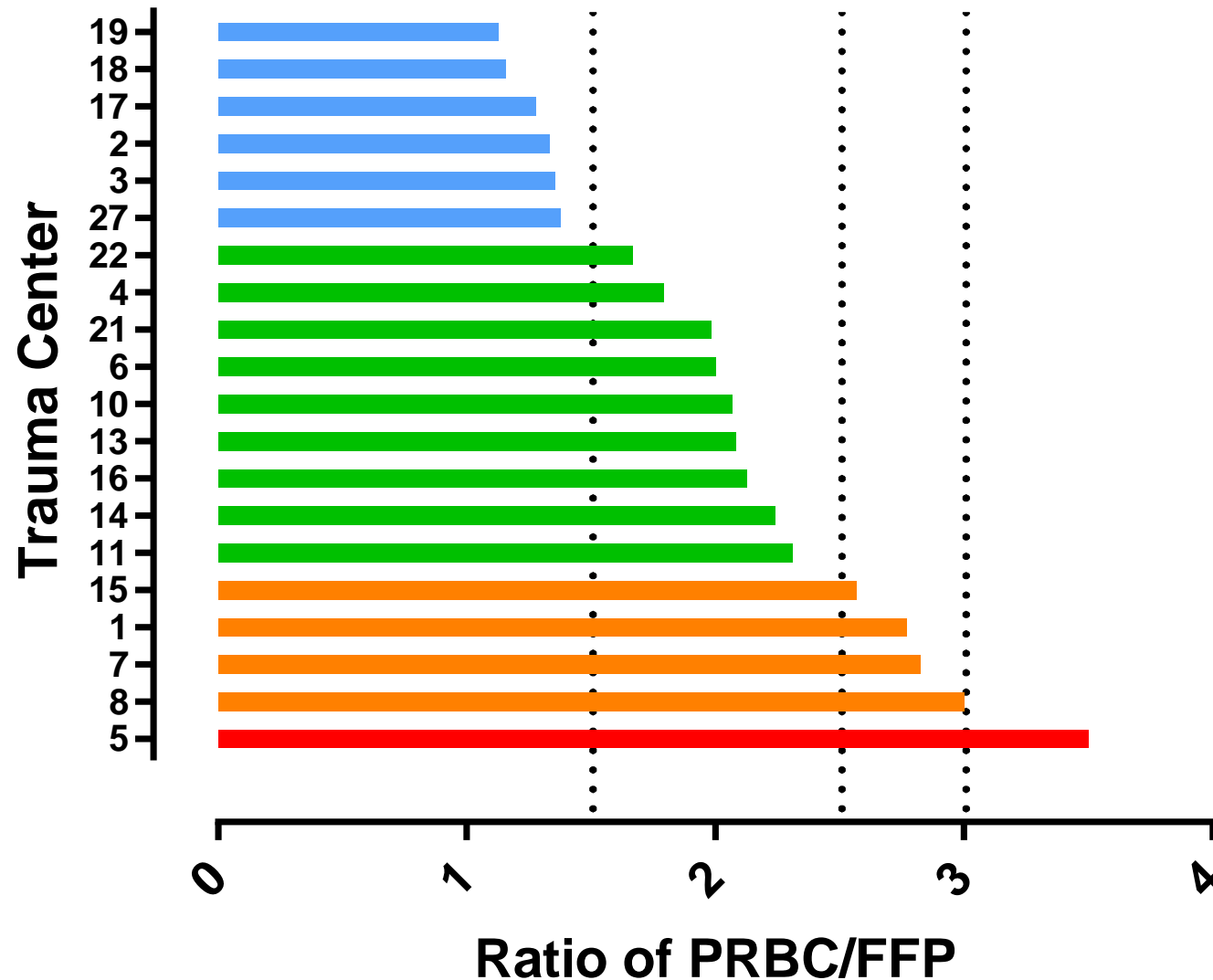
# MTQIP 2014 Hospital Metrics

## ◆ Massive Transfusion

- $\geq 4$  units PRBC's in first 4 hrs
- Average of ratio for each patient

| Ratio PRBC/FFP | Points |
|----------------|--------|
| < 1.5          | 10     |
| 1.6 – 2.5      | 7.5    |
| > 2.5          | 5      |
| > 3.0          | 0      |

# Blood Product Ratio in first 4 hrs if $\geq 4$ uPRBCs





# Patient List - Blood

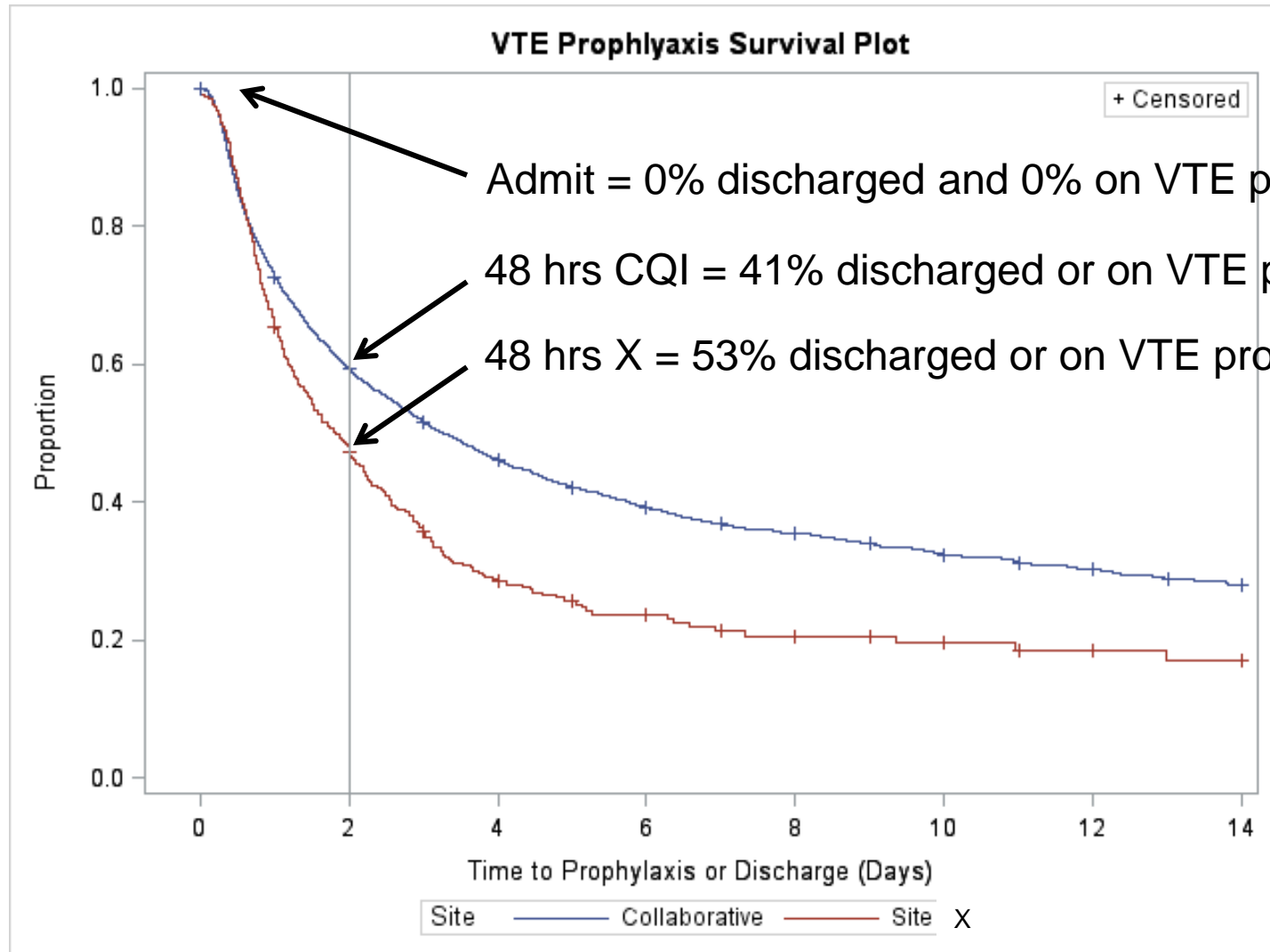
| recordno | traumactr | age   | blunt       | ed_arrrdate | ed_arrrtime | ed_bp | ed_pulse | ed_mtr | usrais_iss | prbc4 | ffp4 | plt4 | cryo4 | ratio4   |
|----------|-----------|-------|-------------|-------------|-------------|-------|----------|--------|------------|-------|------|------|-------|----------|
| 334189   |           | 35.13 | Blunt       | 09-Jul-12   | 01:35       | 64    | 151      | 6      | 10         | 6     | 2    | 5    | 0     | 3        |
| 334900   |           | 63.31 | Blunt       | 22-Nov-12   | 03:11       | 110   | 81       | 1      | 38         | 10    | 10   | 10   | 0     | 1        |
| 335005   |           | 79.95 | Blunt       | 21-Jan-13   | 20:48       | 99    | 84       | 1      | 34         | 4     | 4    | 0    | 0     | 1        |
| 335037   |           | 61.83 | Blunt       | 10-Feb-13   | 18:03       | 137   | 100      | 1      | 22         | 4     | 0    | 0    | 0     |          |
| 335050   |           | 67.66 | Blunt       | 18-Feb-13   | 15:00       | 107   | 106      | 6      | 16         | 7     | 8    | 15   | 0     | 0.875    |
| 335055   |           | 31.32 | Penetrating | 18-Feb-13   | 17:17       | 0     | 0        | 1      | 9          | 11    | 0    | 0    | 0     |          |
| 335218   |           | 61.61 | Blunt       | 08-Mar-13   | 01:08       | 65    | 73       | 6      | 59         | 4     | 3    | 0    | 0     | 1.333333 |
| 335401   |           | 23.49 | Blunt       | 21-Jun-13   | 17:12       | 137   | 98       | 6      | 16         | 4     | 0    | 0    | 0     |          |
| 335425   |           | 65.17 | Blunt       | 29-Jun-13   | 14:41       | 119   | 150      | 6      | 34         | 38    | 36   | 40   | 2     | 1.055556 |

- ◆ Your list of patients
- ◆ 0 = No
- ◆ 1 = Yes
- ◆ Injury, Blood products, TXA, Operation, Angio
- ◆ Additional data?

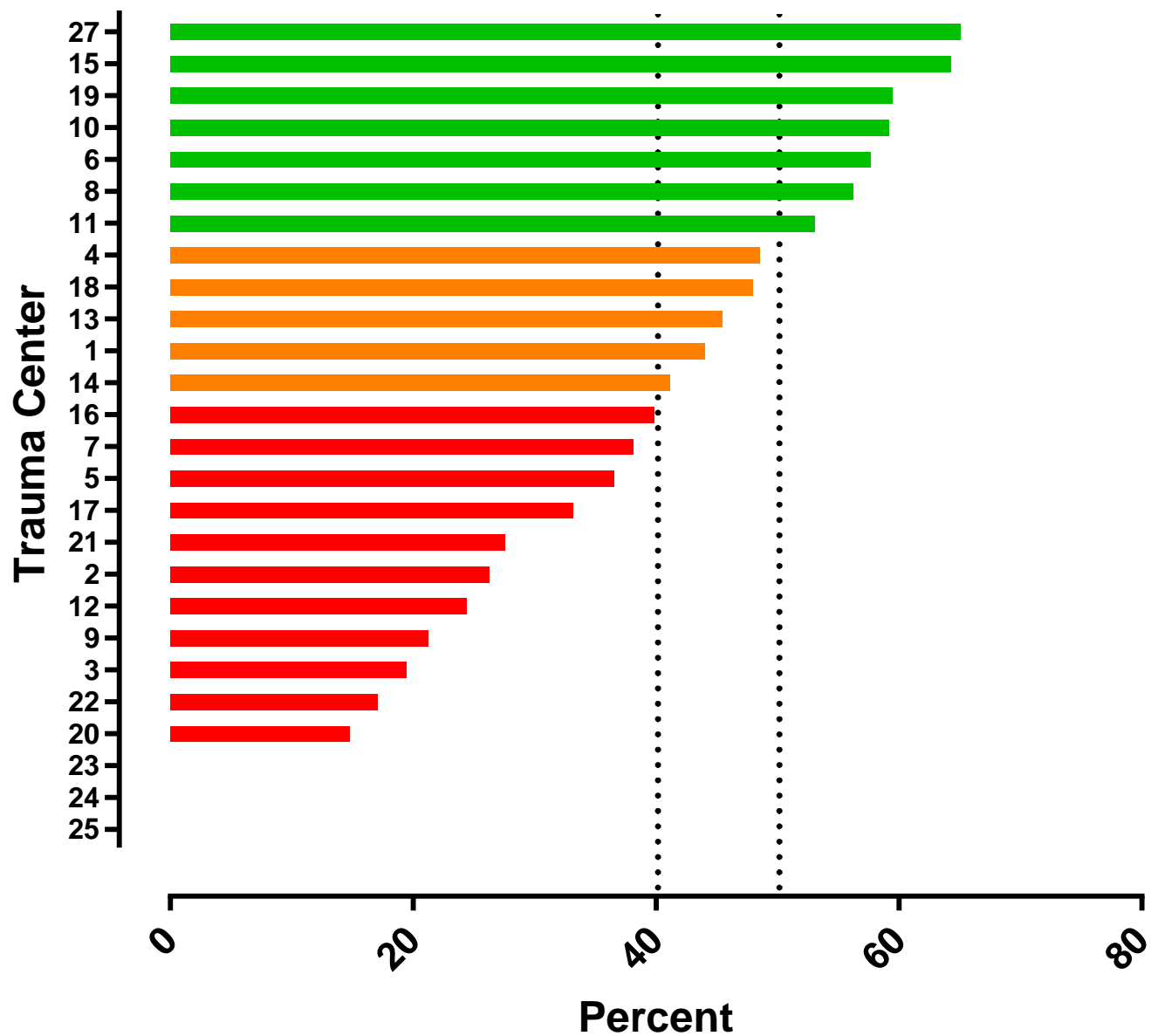
# VTE Prophylaxis

- ◆ Admit Trauma Service
  - In hospital with no VTE pro = non-Event
  - Discharge Home in 48 hrs = Event
  - VTE Prophylaxis in 48 hrs = Event
- ◆ Rate
  - > 50% (10 points)
  - > 40% (5 points)
  - 0 – 40% (0 points)

# VTE Prophylaxis



# Rate of VTE Prophylaxis by 48 hrs



# Collaborative Metrics



# MTQIP 2014 Collaborative Metrics

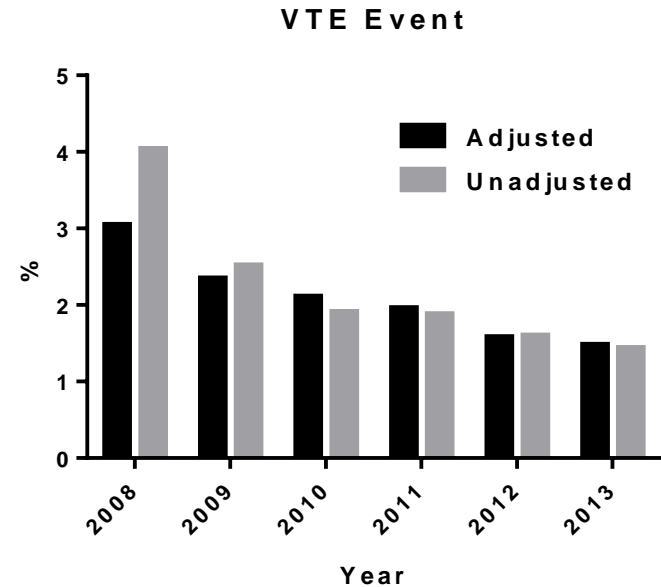
## ◆ VTE

### ■ VTE Rate

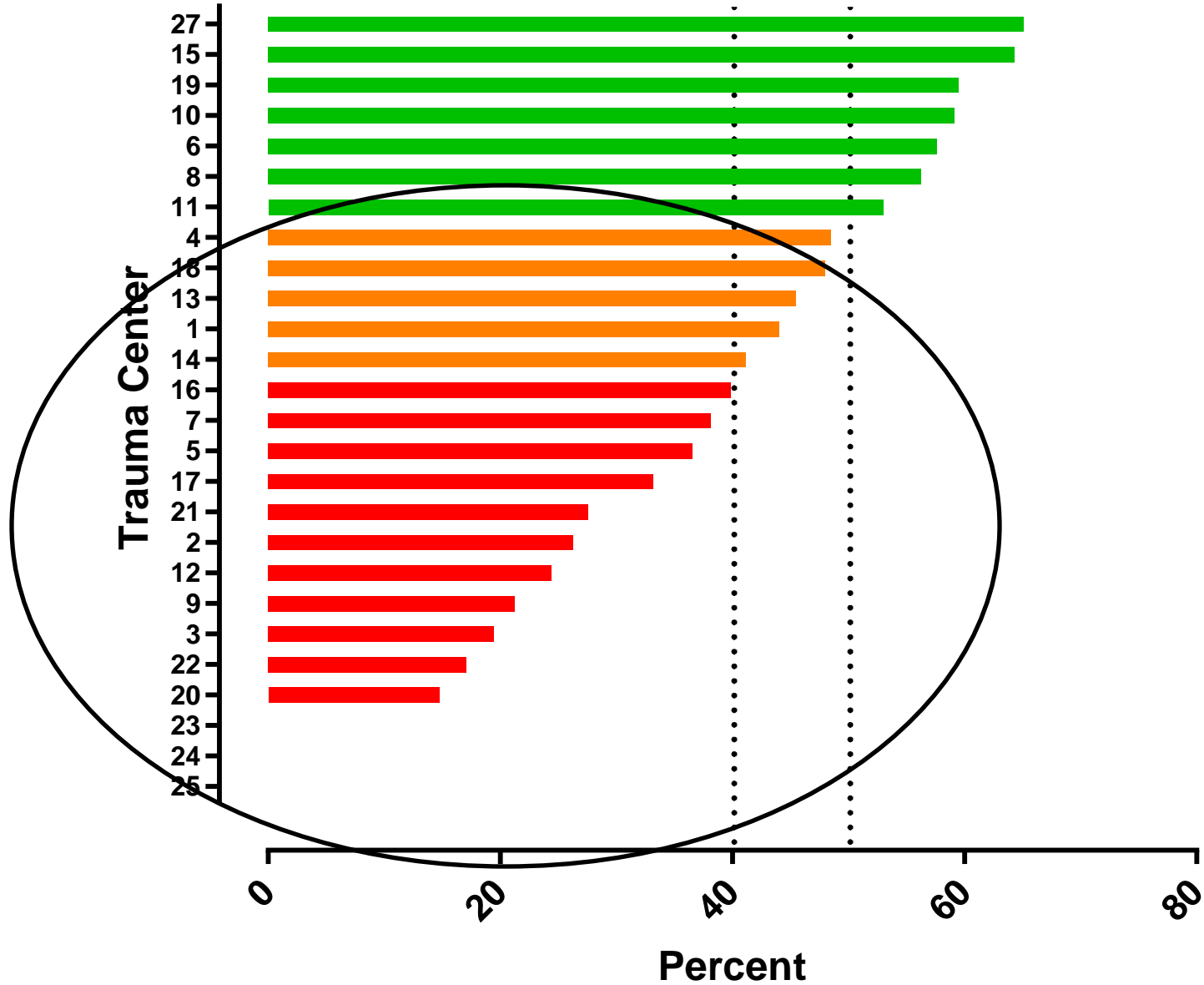
- Begin = 2.5 %
- Current = 1.6 %
- Target = 1.5 %

### ■ 48 hr VTE Prophylaxis Rate

- Begin = 38 %
- Current = 41 %
- Target = 50 %



# Rate of VTE Prophylaxis by 48 hrs



# MTQIP 2014 Collaborative Metrics

- ◆ Hemorrhage ( $\geq 4$  u PRBC's first 4 hrs)
  - % of patients with 4hr PRBC/FFP ratio  $< 2.5$ 
    - Begin = 34 %
    - Current = 58 %
    - Target = 80 %



**Blood Products (7/1/12 to 6/30/13)****Inclusion:****PRBC 4hrs  $\geq$  4 units**

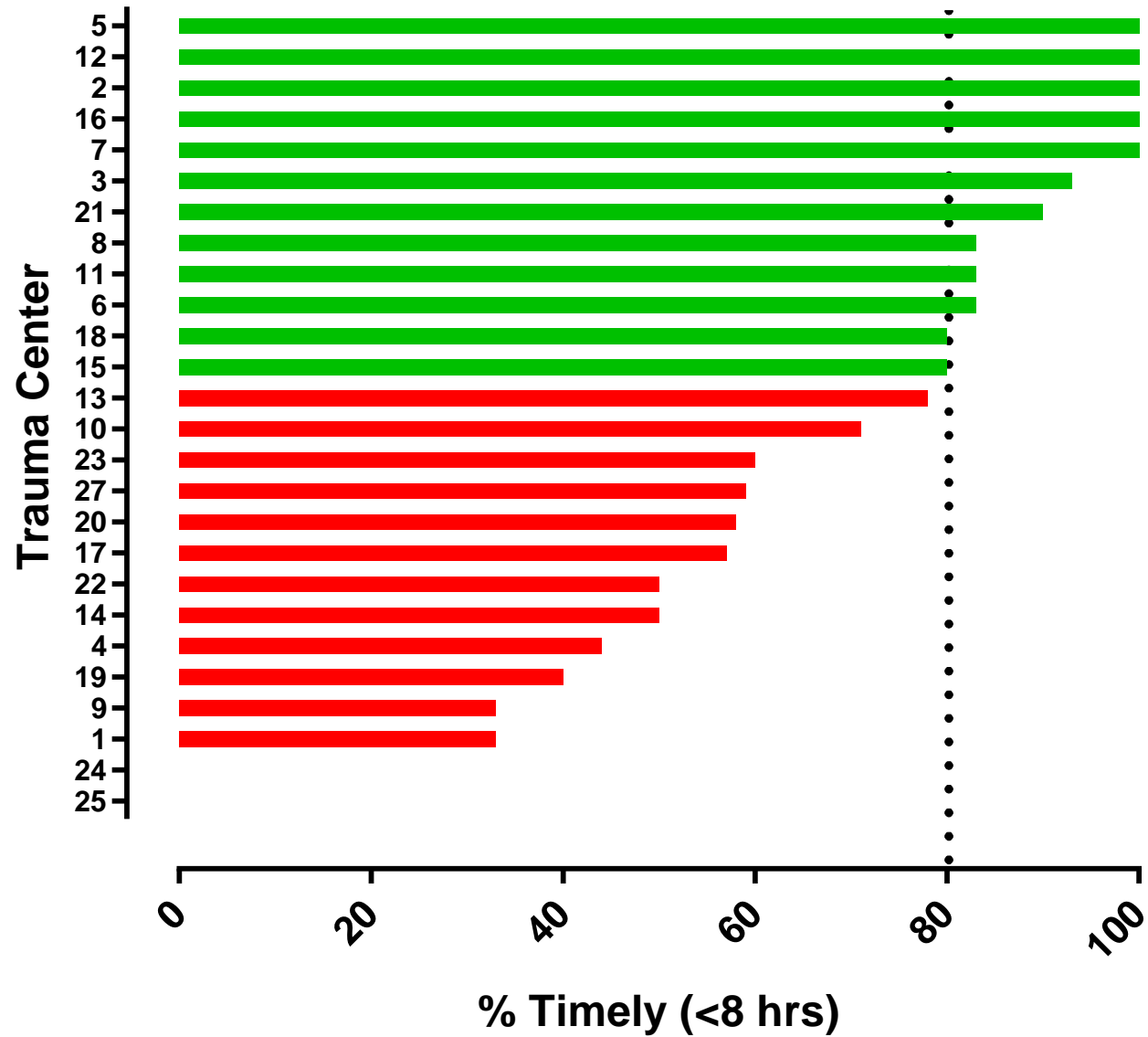
| <u>Trauma Center</u> | <u>N Patients</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs <math>\leq</math> 3</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs <math>\leq</math> 2.5</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>4 hrs <math>\leq</math> 1.5</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>24 hrs</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>24 hrs <math>\leq</math> 2.0</u> | <u>Ratio</u><br><u>PRBC/FFP</u><br><u>24 hrs <math>\leq</math> 1.5</u> | <u>Dead</u> |
|----------------------|-------------------|---|---|---|---|--|--|--|-------------|
| 19                   | 6                 | 1.1   | 2   | 2   | 2   | 1.2  | 3  | 3  | 2           |
| 18                   | 11                | 1.2   | 11  | 11  | 10  | 1.1  | 11   | 11   | 5           |
| 17                   | 7                 | 1.3   | 6   | 5   | 5   | 1.3  | 5  | 5  | 3           |
| 2                    | 1                 | 1.3   | 1   | 1   | 1   | 1.5  | 1  | 1  | 0           |
| 3                    | 5                 | 1.4   | 5   | 5   | 4   | 1.5  | 4  | 3  | 1           |
| 27                   | 9                 | 1.4   | 6   | 5   | 5   | 1.1  | 5  | 5  | 3           |
| 22                   | 1                 | 1.7   | 1   | 1   | 0   | 3.3  | 0  | 0  | 1           |
| 4                    | 5                 | 1.8   | 3   | 2   | 1   | 1.8  | 2  | 1  | 4           |
| 21                   | 16                | 2.0   | 10  | 8   | 5   | 1.9  | 8  | 4  | 8           |
| 6                    | 1                 | 2.0   | 1   | 1   | 0   | 1.4  | 1  | 1  | 1           |
| 10                   | 13                | 2.1   | 9   | 9   | 7   | 1.6  | 10   | 8  | 1           |
| 13                   | 5                 | 2.1   | 3   | 3   | 2   | 1.5  | 3  | 2  | 0           |
| 16                   | 4                 | 2.1   | 2   | 2   | 0   | 2.0  | 1  | 0  | 2           |
| 14                   | 6                 | 2.2   | 3   | 3   | 1   | 2.3  | 2  | 1  | 5           |
| 11                   | 10                | 2.3   | 6   | 6   | 3   | 2.1  | 6  | 3  | 6           |
| 15                   | 16                | 2.6   | 9   | 8   | 2   | 2.1  | 9  | 6  | 4           |
| 1                    | 9                 | 2.8   | 4   | 4   | 3   | 2.6  | 5  | 3  | 5           |
| 7                    | 9                 | 2.8   | 5   | 5   | 1   | 1.9  | 4  | 3  | 2           |
| 8                    | 1                 | 3.0   | 1   | 0   | 0   | 3.0  | 0  | 0  | 0           |
| 5                    | 2                 | 3.5   | 1   | 0   | 0   | 3.5  | 0  | 0  | 1           |
| 9                    | 1                 | --  | 0   | 0   | 0   | --   | 0  | 0  | 1           |
| 20                   | 2                 | --  | 0   | 0   | 0   | --   | 0  | 0  | 0           |
| Total                | 140               | 1.8   | 89  | 81  | 52  | 1.6  | 80   | 60   | 55          |

# MTQIP 2014 Collaborative Metrics

## ◆ Brain Injury

- % of eligible patients with intervention  $\leq$  8 hours after arrival
  - Begin = 65 %
  - Current = 72 %
  - Target = 80 %

# TBI Intervention Timing






# Patient List – TBI Intervention

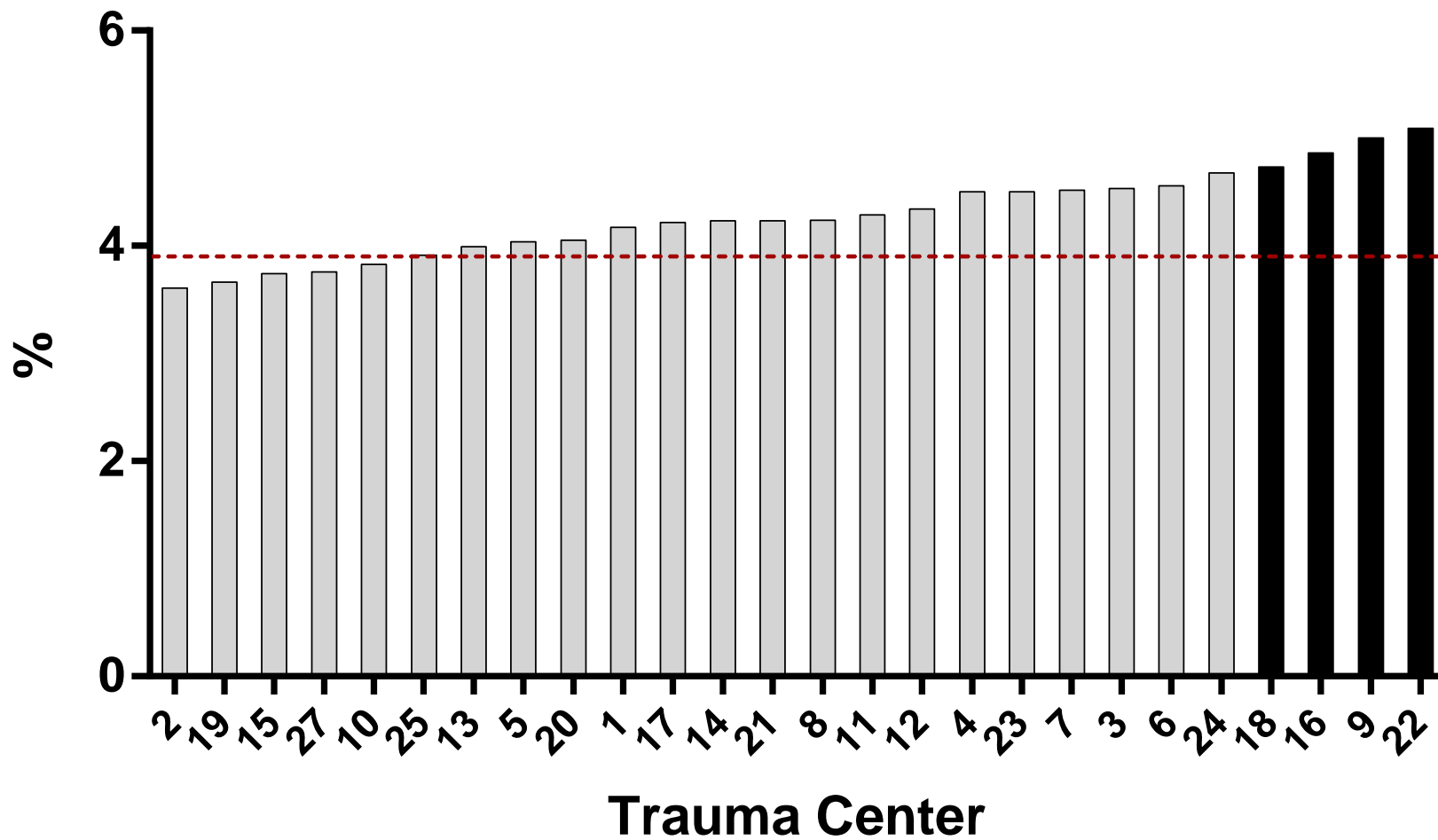
| any_m | brain_op | vent | ippm | o2mon | jvb | time_to_br | time_to_ve | time_to_ip | time_to_o2 | time_to_jv | minimum_ | earliest_pl | timely |
|-------|----------|------|------|-------|-----|------------|------------|------------|------------|------------|----------|-------------|--------|
| 1     | 0        | 1    | 0    | 0     | 0   |            | 700        |            |            |            | 11.66667 | vent        | 0      |
| 1     | 0        | 1    | 1    | 0     | 0   |            | 944        | 944        |            |            | 15.73333 | multiple    | 0      |
| 1     | 0        | 1    | 0    | 0     | 0   |            | 1696       |            |            |            | 28.26667 | vent        | 0      |
| 1     | 0        | 0    | 1    | 0     | 0   |            |            | 1640       |            |            | 27.33333 | ippm        | 0      |
| 1     | 0        | 1    | 1    | 0     | 0   |            |            | 402        |            |            | 6.7      | ippm        | 1      |
| 0     | 0        | 0    | 0    | 0     | 0   |            |            |            |            |            |          |             | 0      |
| 0     | 0        | 0    | 0    | 0     | 0   |            |            |            |            |            |          |             | 0      |
| 1     | 0        | 1    | 0    | 0     | 0   |            | 278        |            |            |            | 4.63333  | vent        | 1      |
| 0     | 0        | 0    | 0    | 0     | 0   |            |            |            |            |            |          |             | 0      |
| 0     | 0        | 0    | 0    | 0     | 0   |            |            |            |            |            |          |             | 0      |
| 1     | 1        | 1    | 0    | 0     | 0   | 410        | 410        |            |            |            | 6.83333  | multiple    | 1      |
| 1     | 0        | 1    | 0    | 0     | 0   |            | 1248       |            |            |            | 20.8     | vent        | 0      |

- ◆ Your list of patients
- ◆ 0 = No
- ◆ 1 = Yes
- ◆ Injury, Treatments, Time to, etc.
- ◆ Additional data?

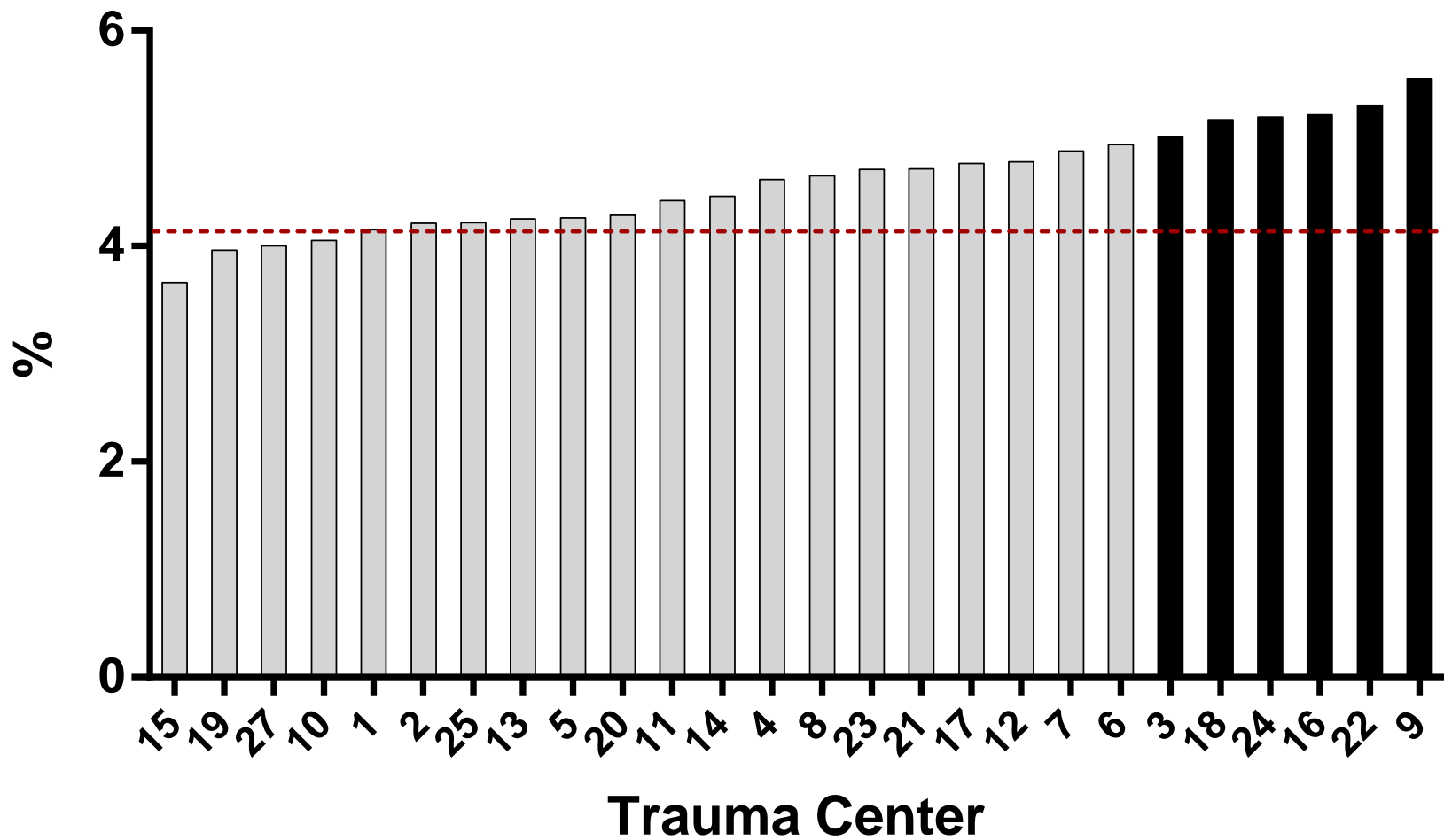
# MTQIP Outcomes

- ◆ Arbor Metrix Report
- ◆ 7/1/2012 to 6/30/2013
- ◆ Rates
  - Risk and Reliability adjusted
  - Red line is mean
- ◆ Legend
  -  Low-outlier status (better performance)
  -  Non-outlier status (average performance)
  -  High-outlier status (worse performance)

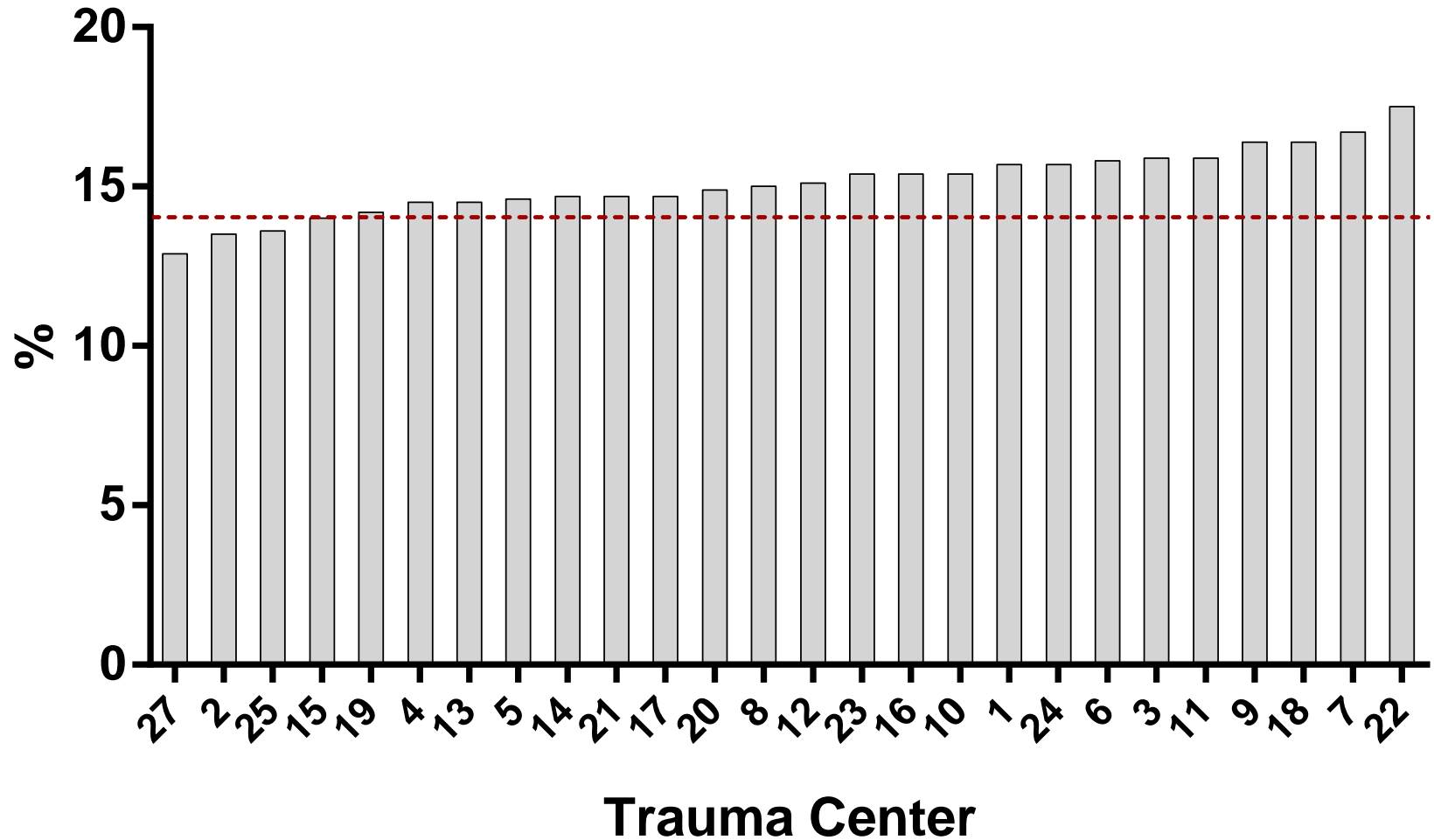
## Mortality (Cohort 1 w/o DOA's)



## Mortality (Cohort 2 w/o DOA's)

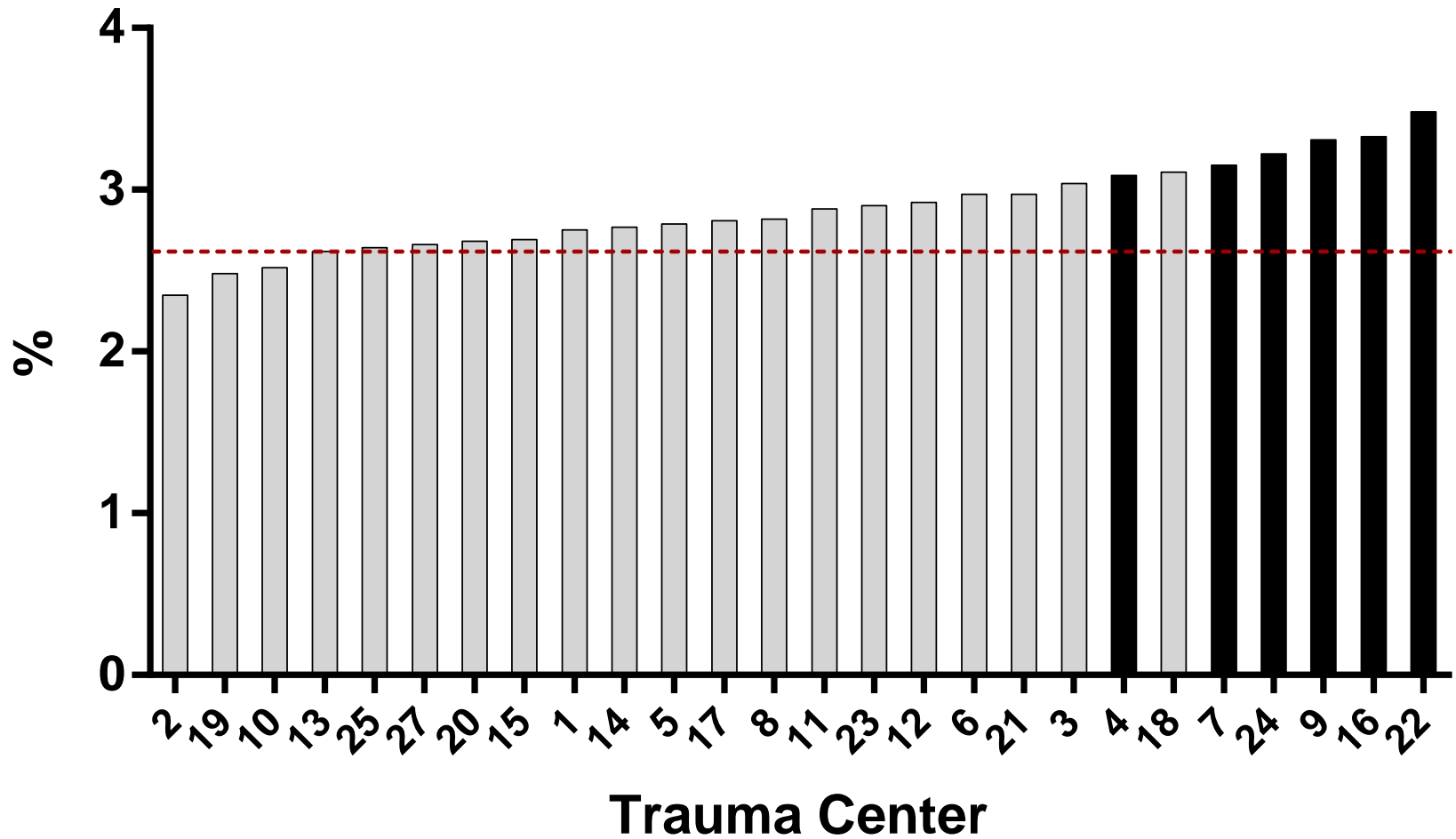


## Mortality (Cohort 3 - Blunt Multi)

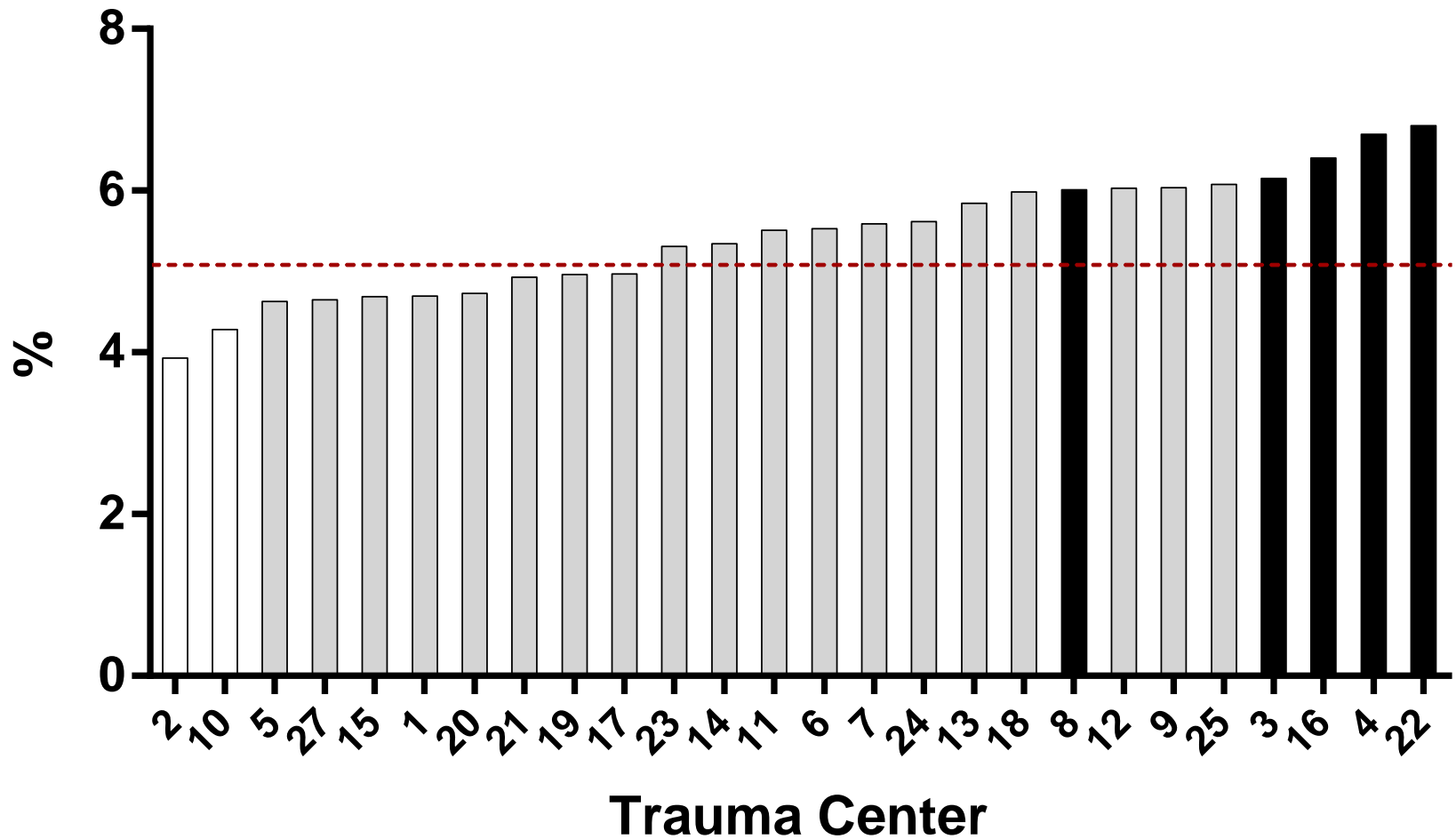




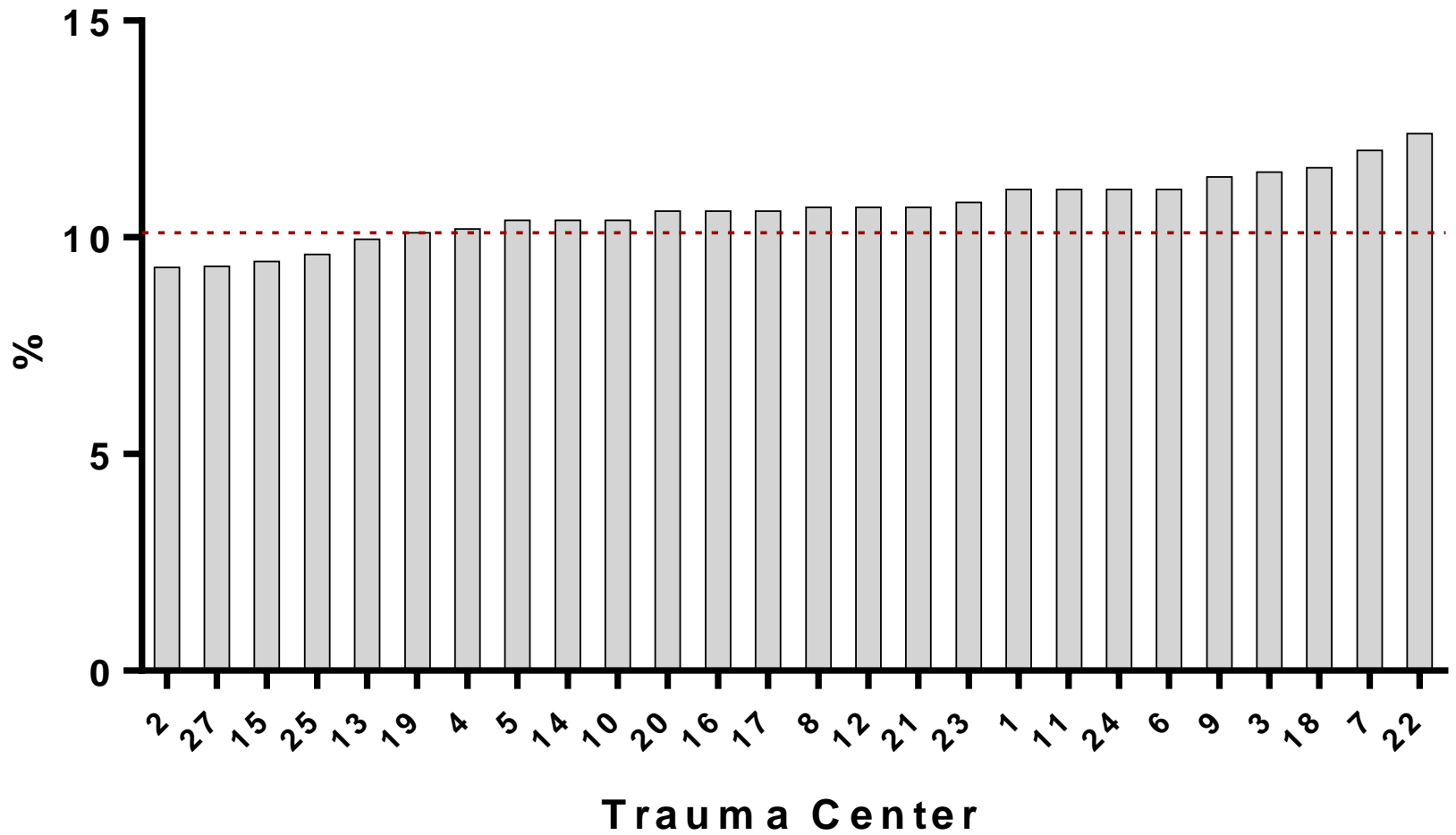
## Mortality (Cohort 4 - Blunt Single)



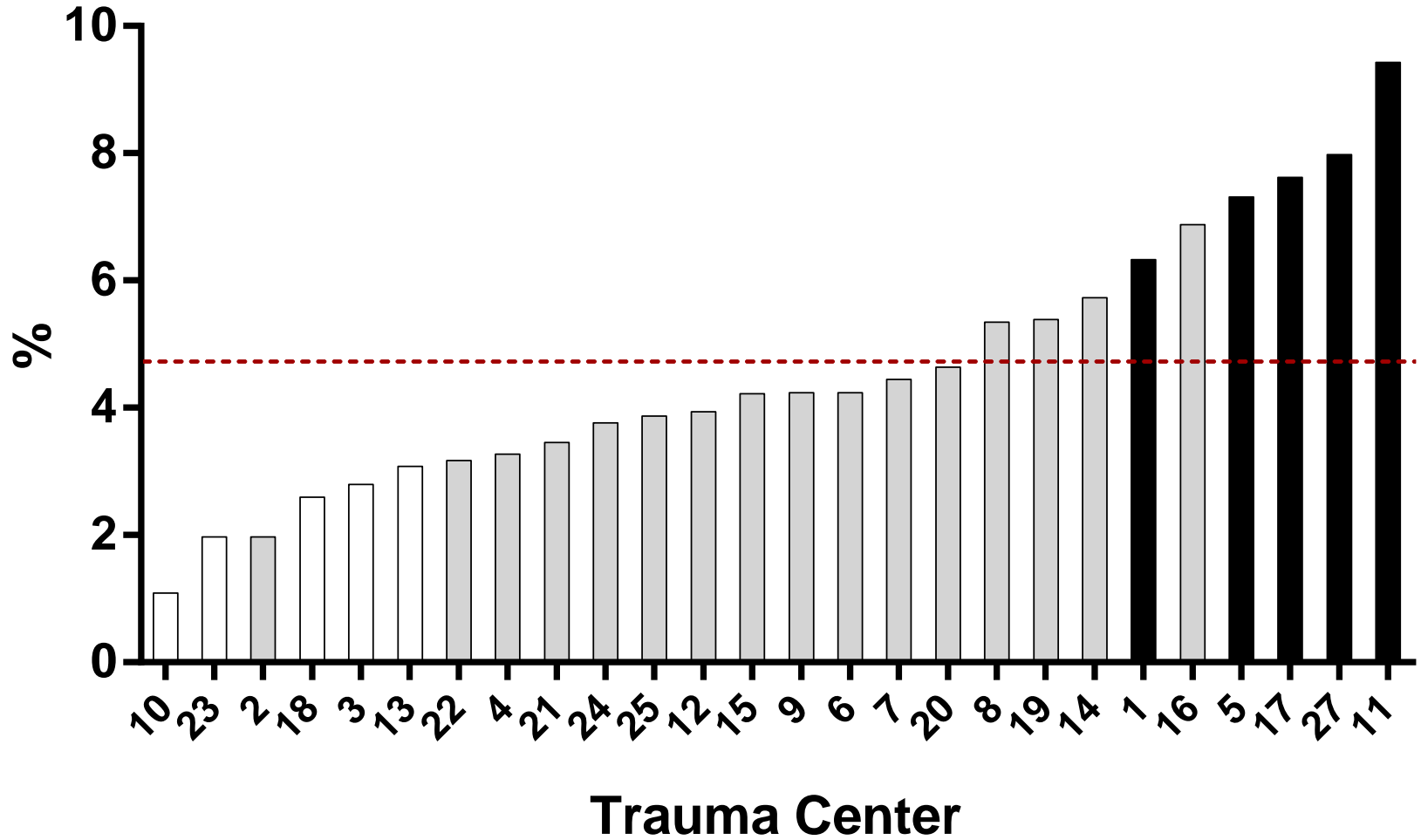
## Mortality or Hospice (Cohort 1 w/o DOA's)



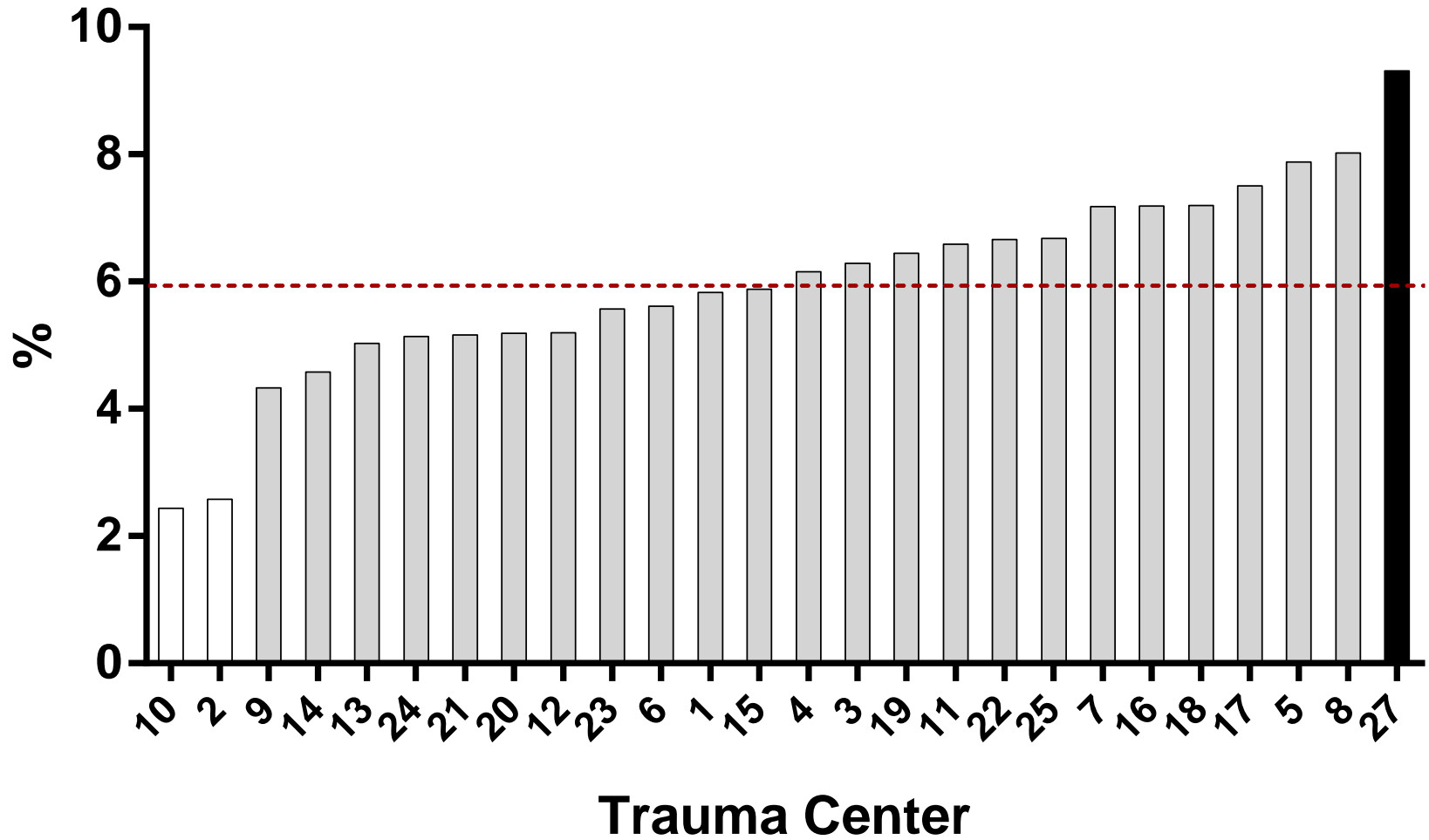
## Penetrating w/o D O A



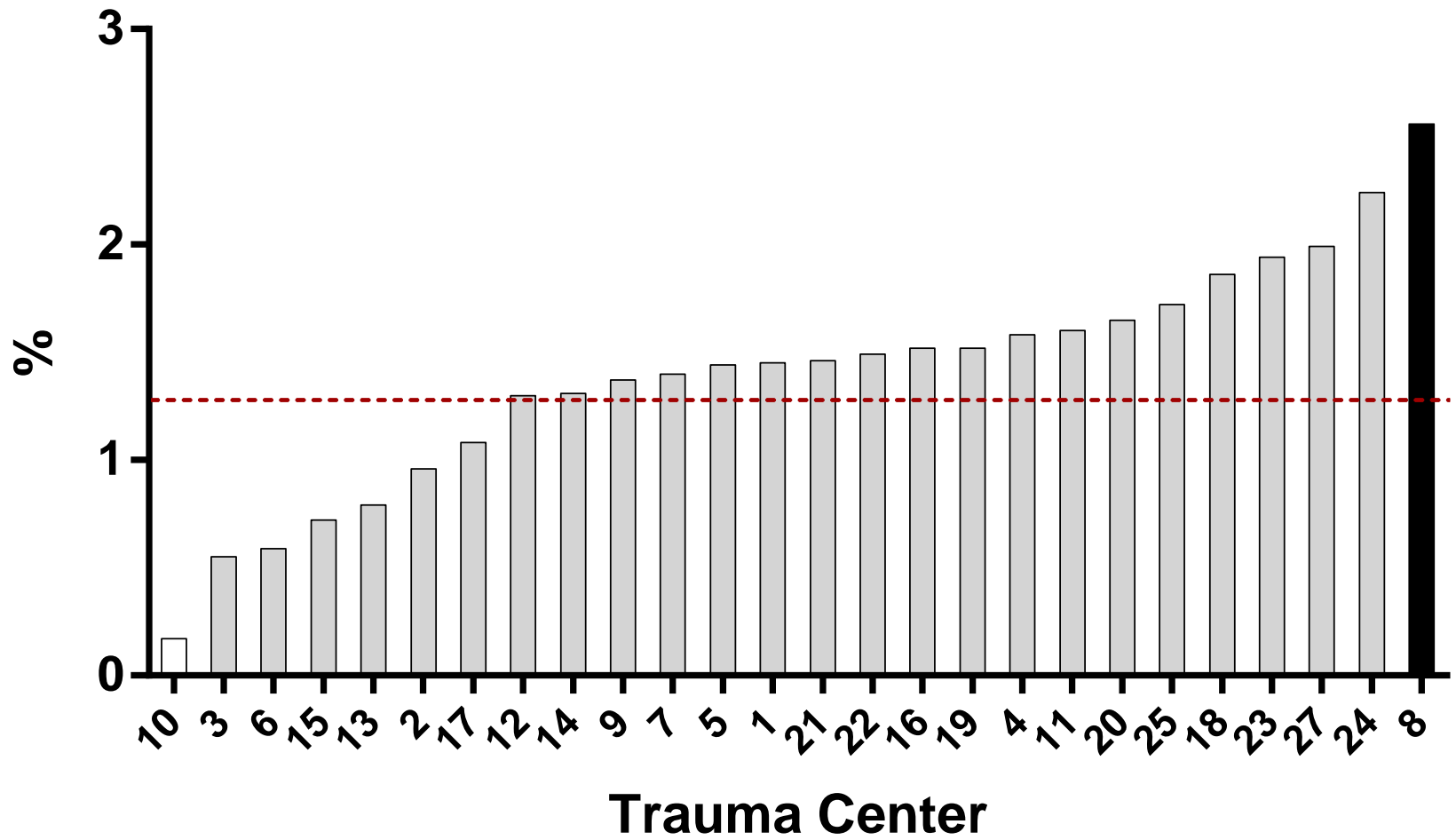
## Complications (Group 1)



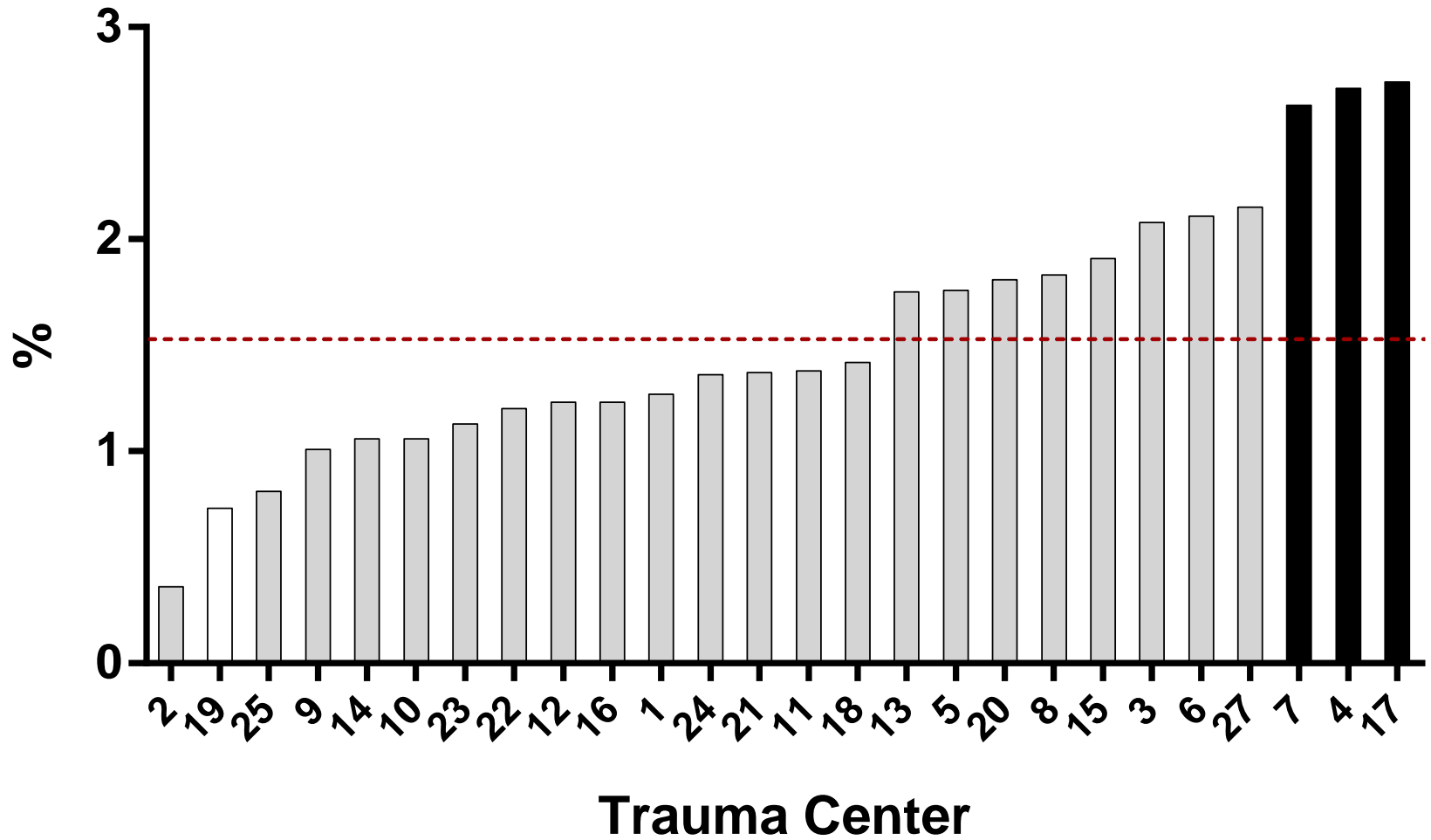
## Complications (Group 2)



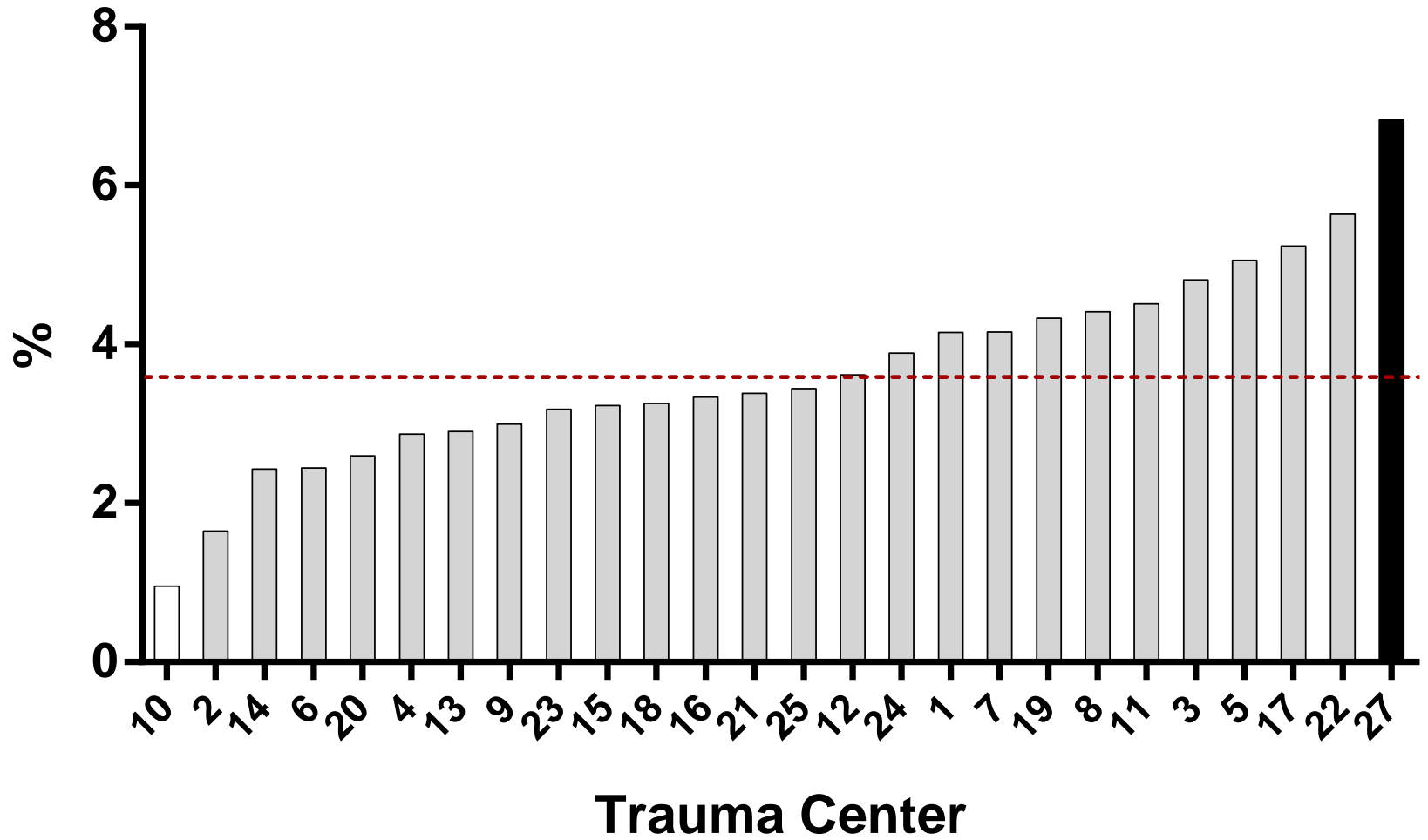
# Cardiac/Stroke



# DVT/Pulmonary Embolus

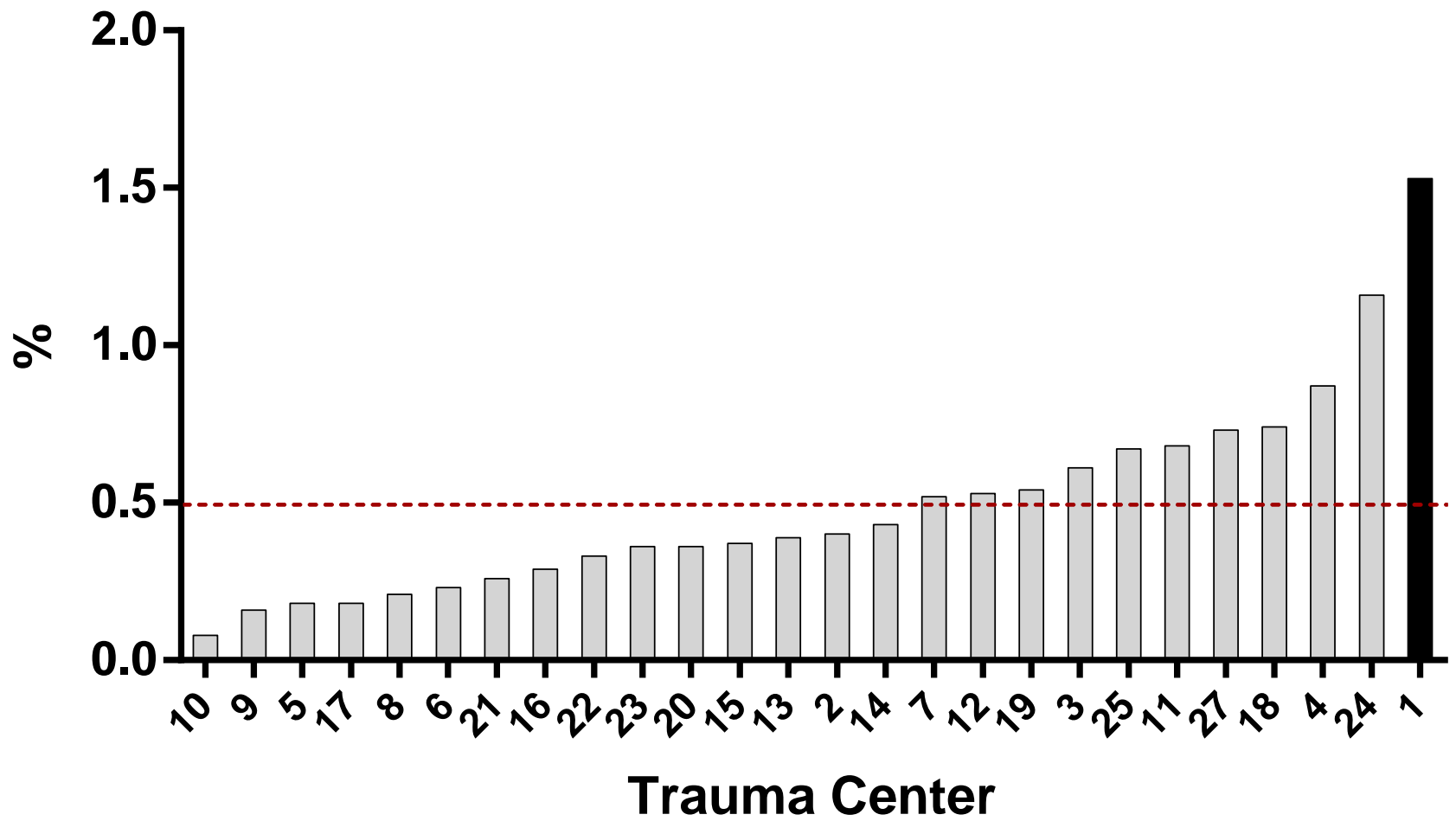


# Pneumonia

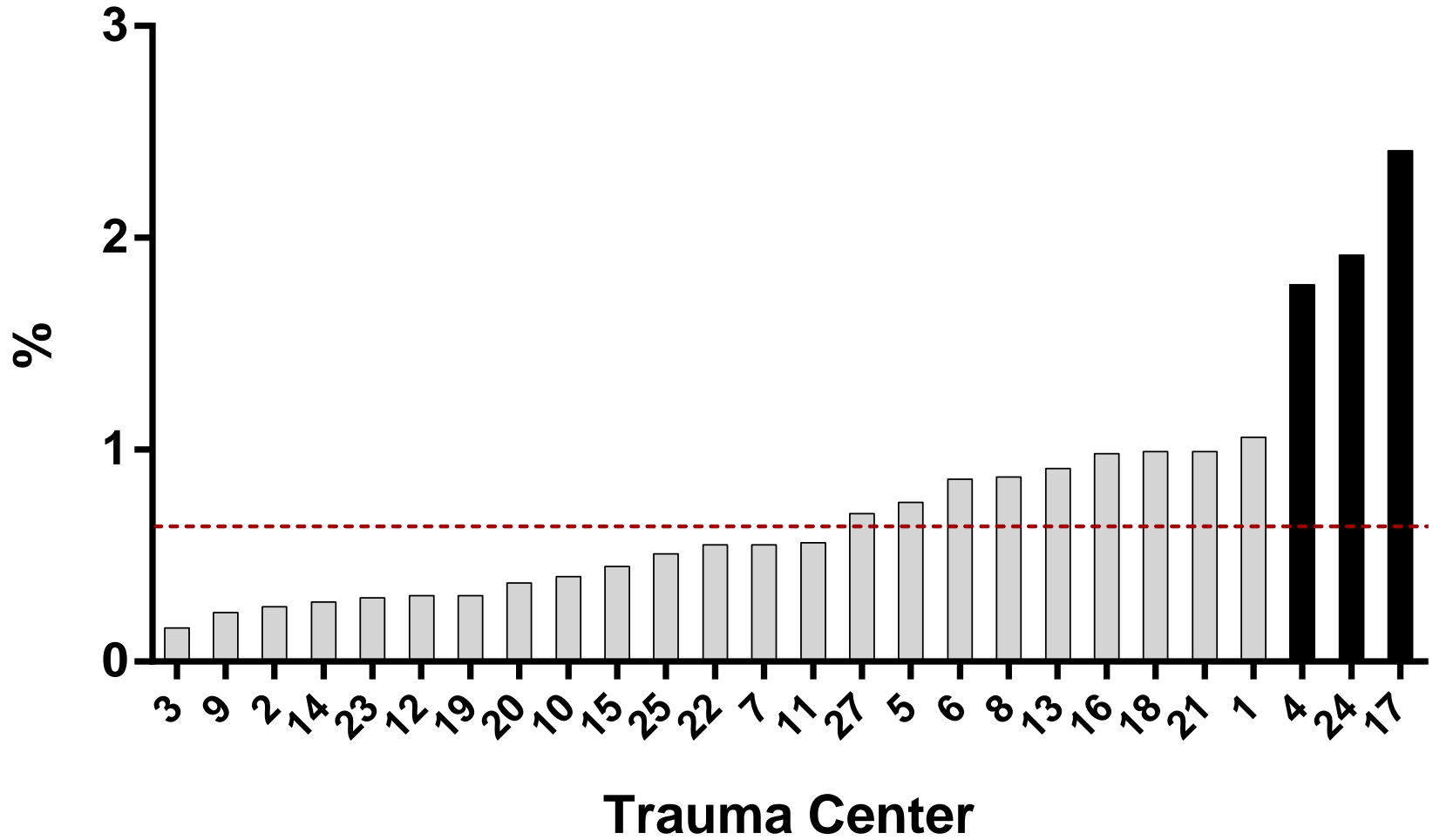




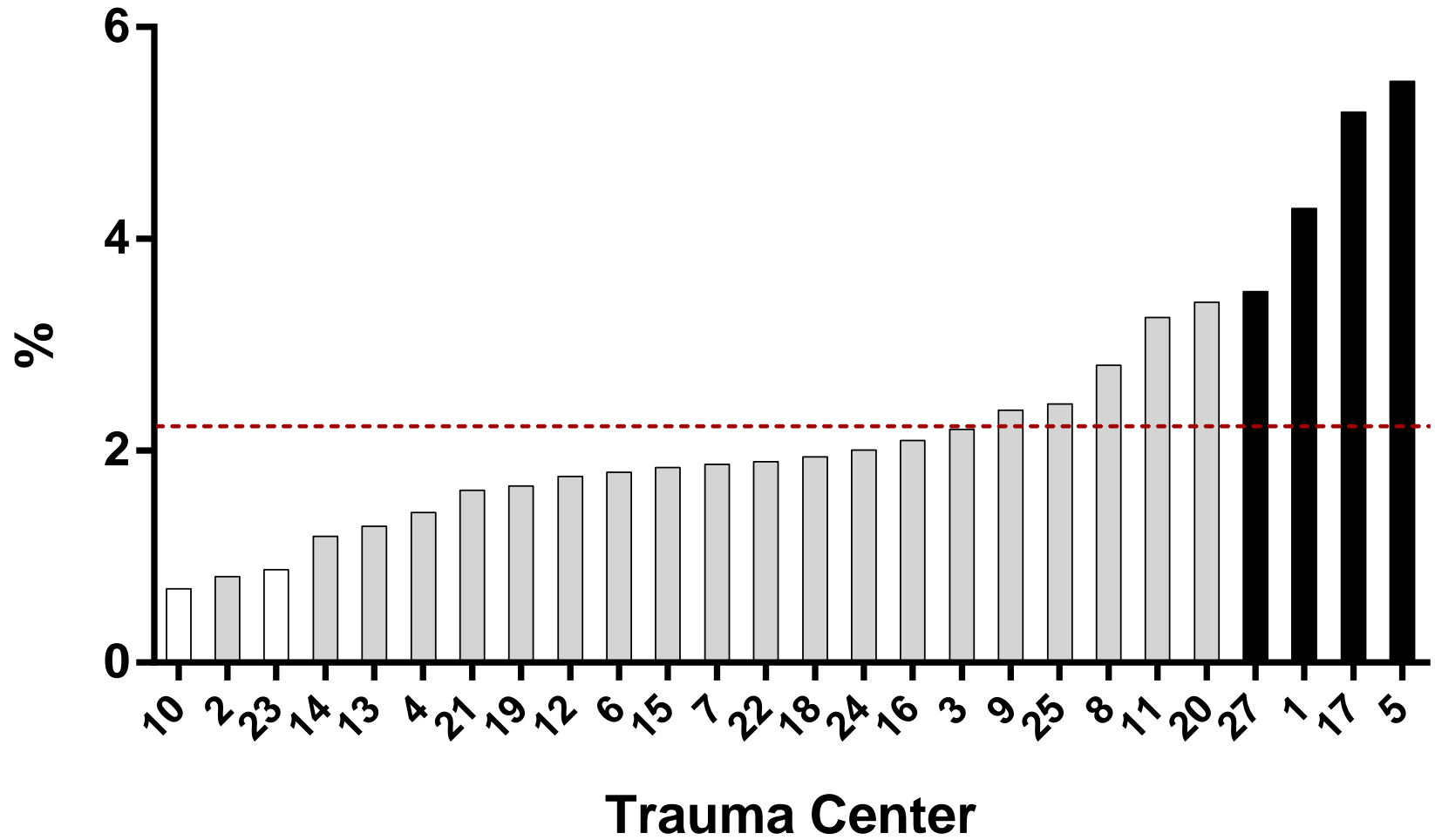
# Renal Failure



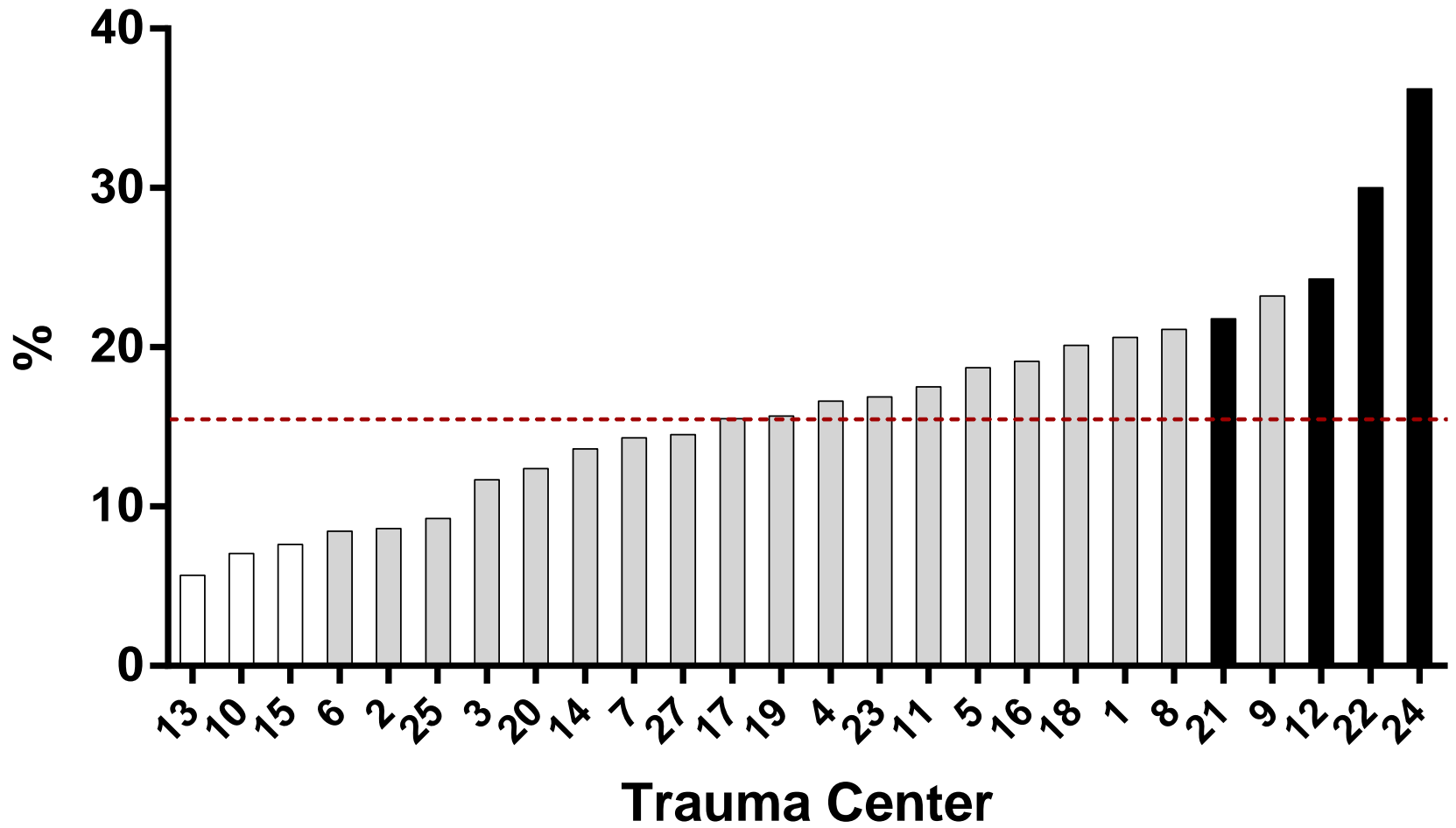
# Sepsis



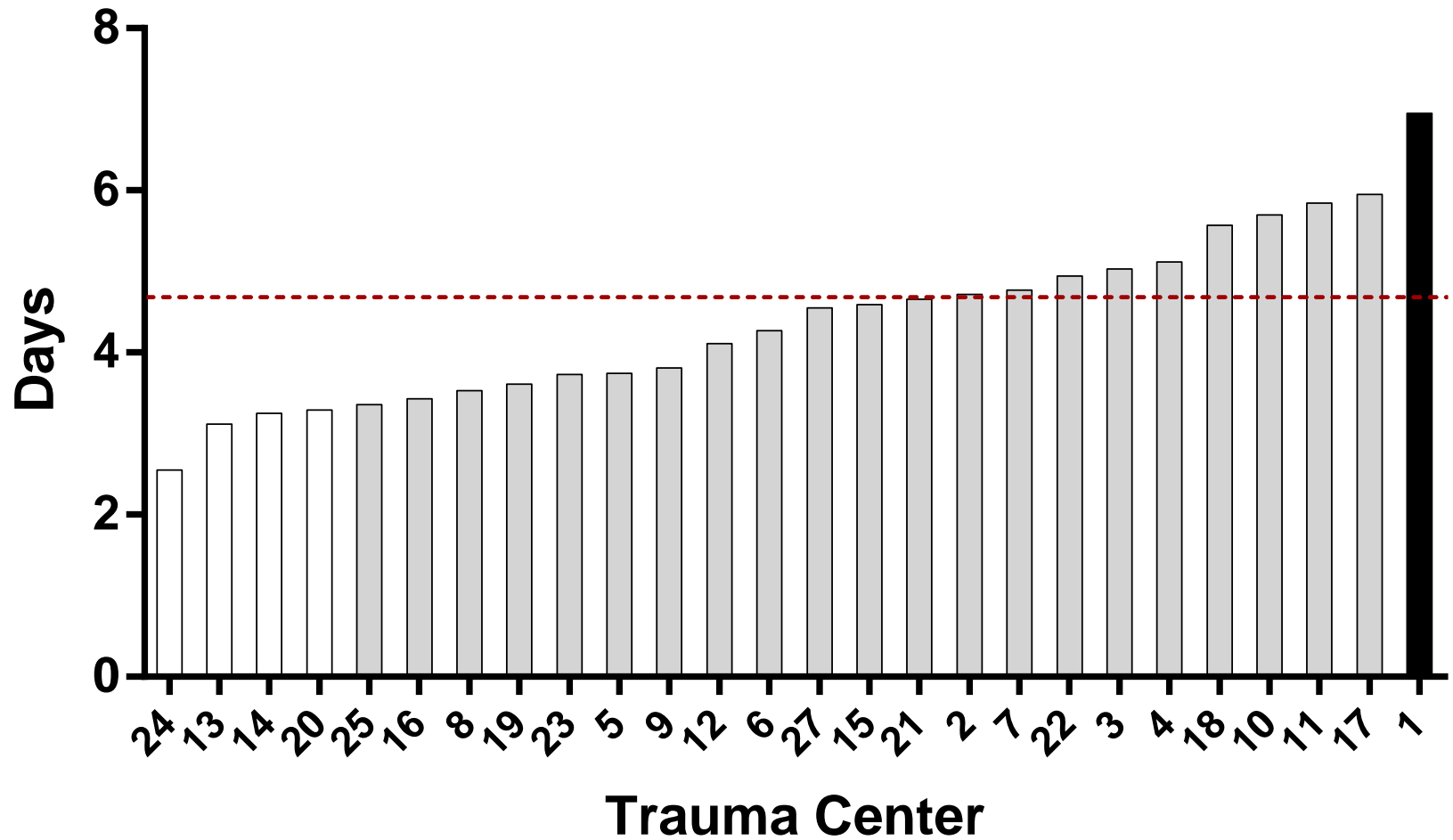
# UTI



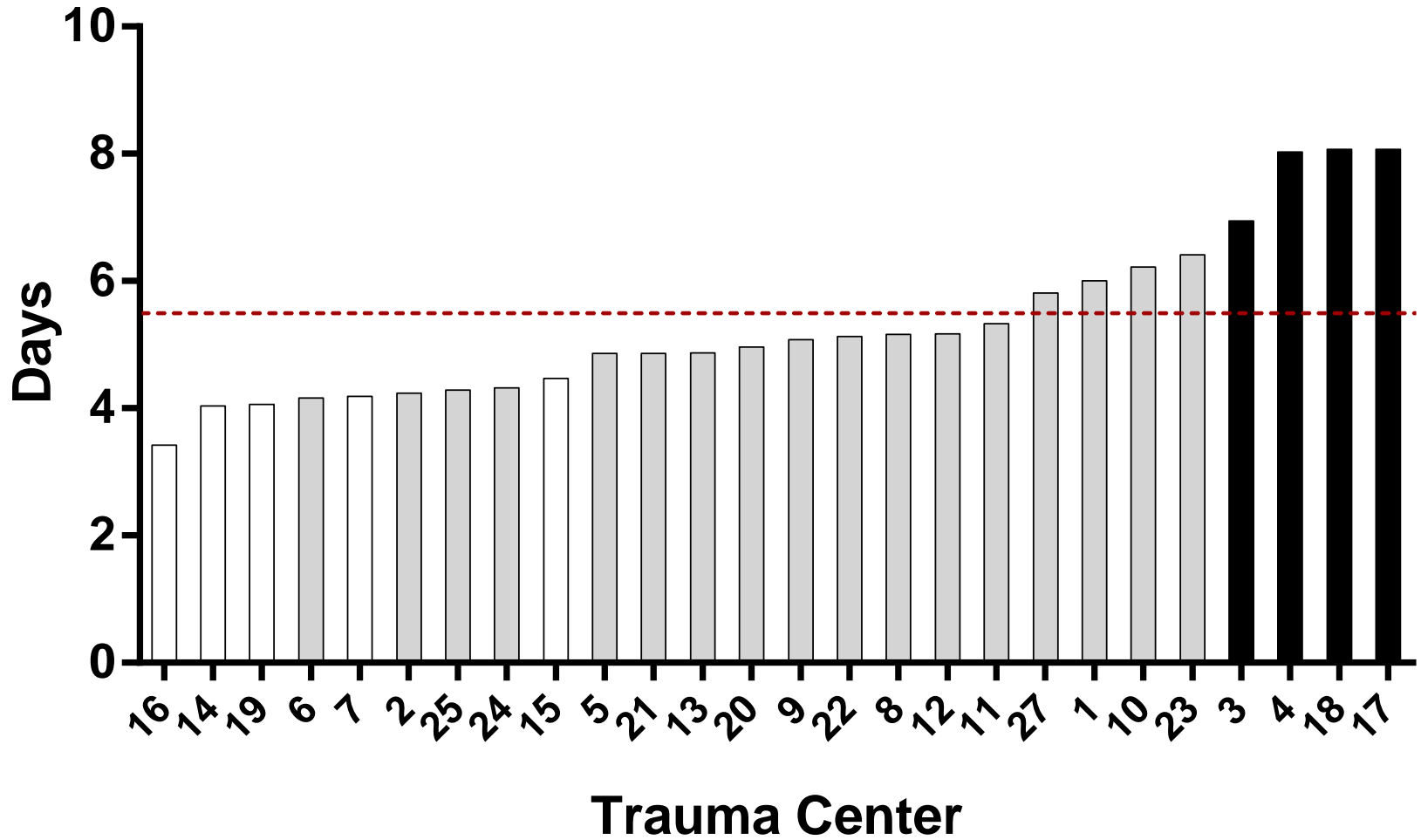
# Failure to Rescue



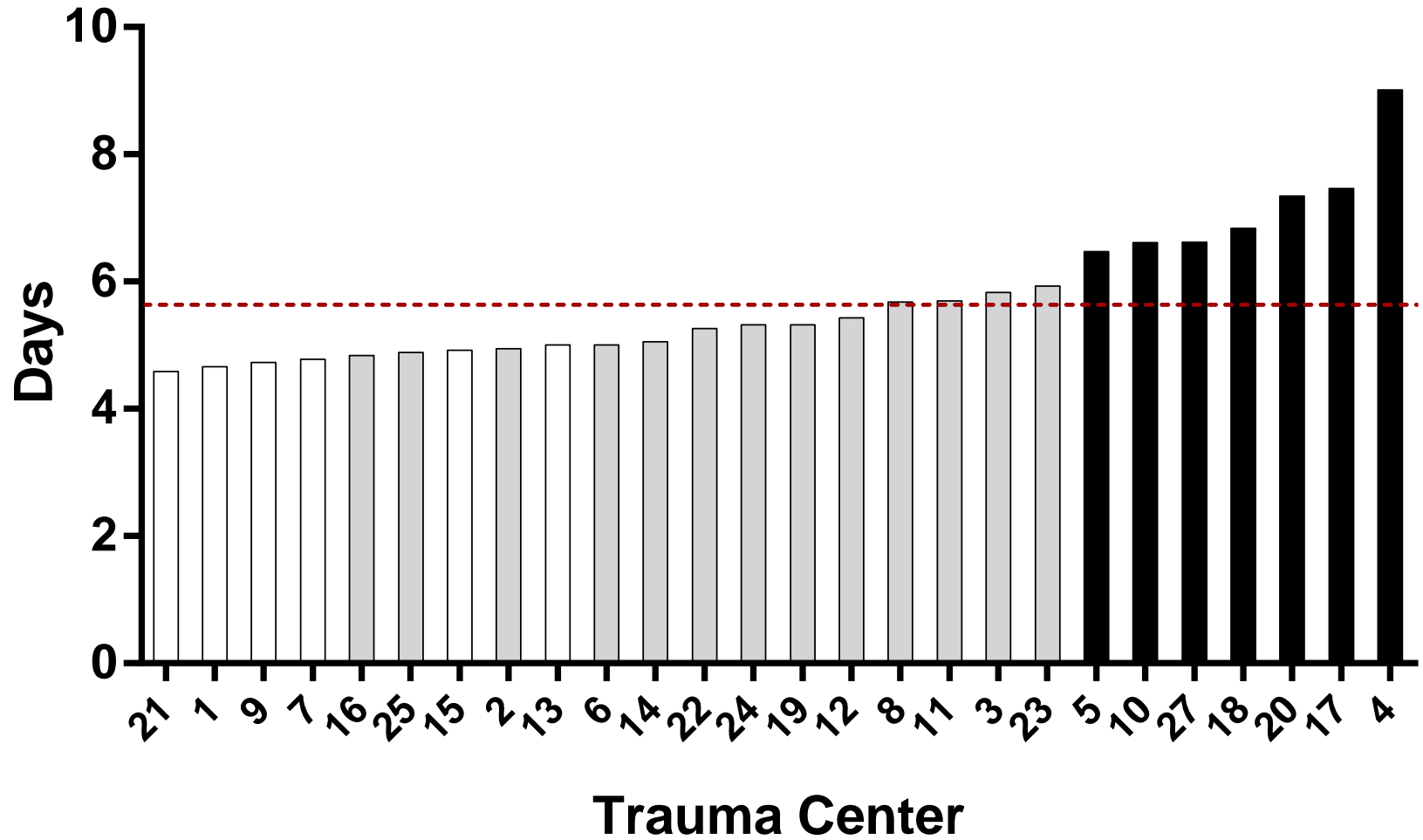
# Adjusted Ventilator Days



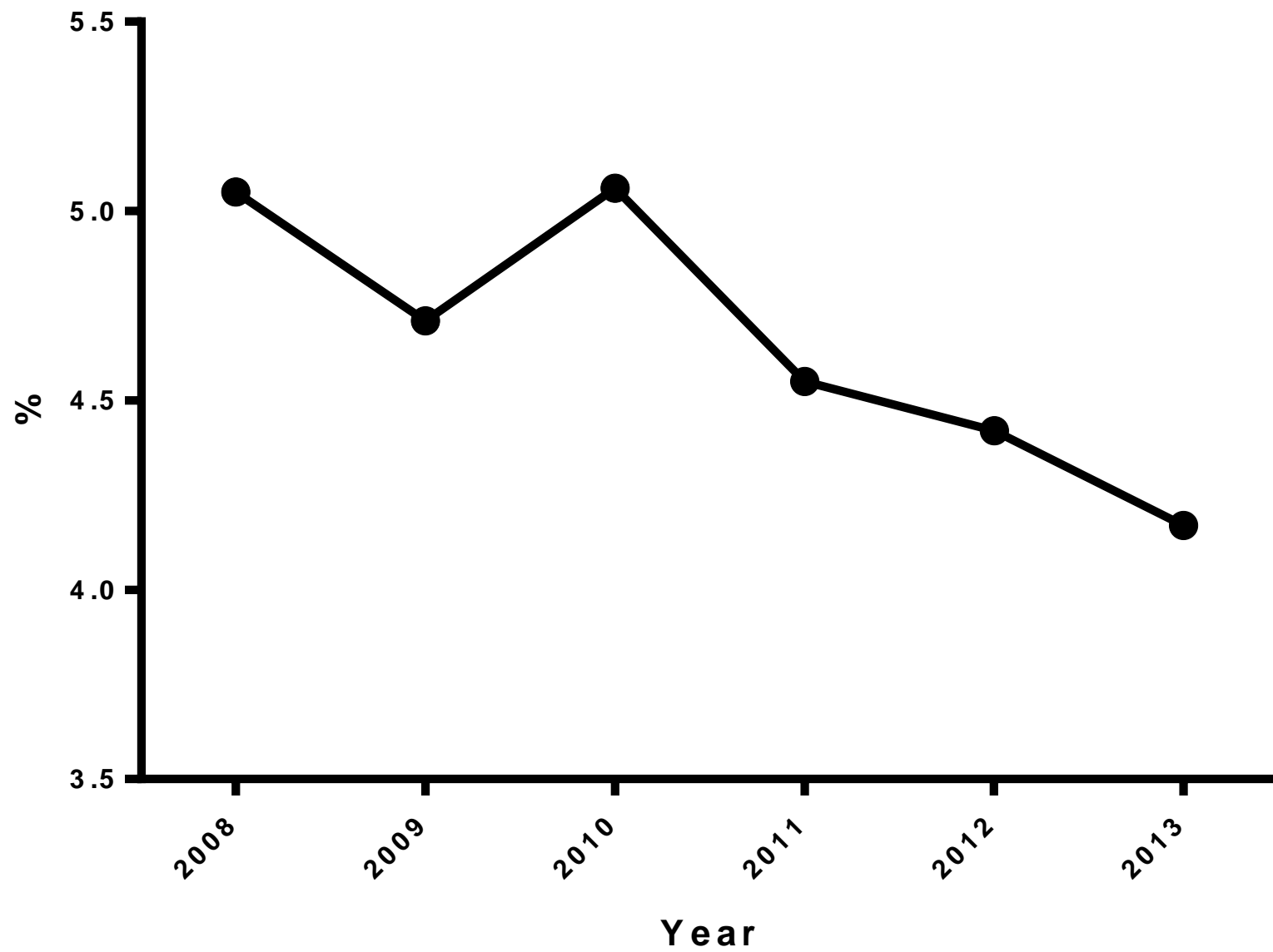
# Adjusted ICU LOS



# Adjusted Hospital LOS

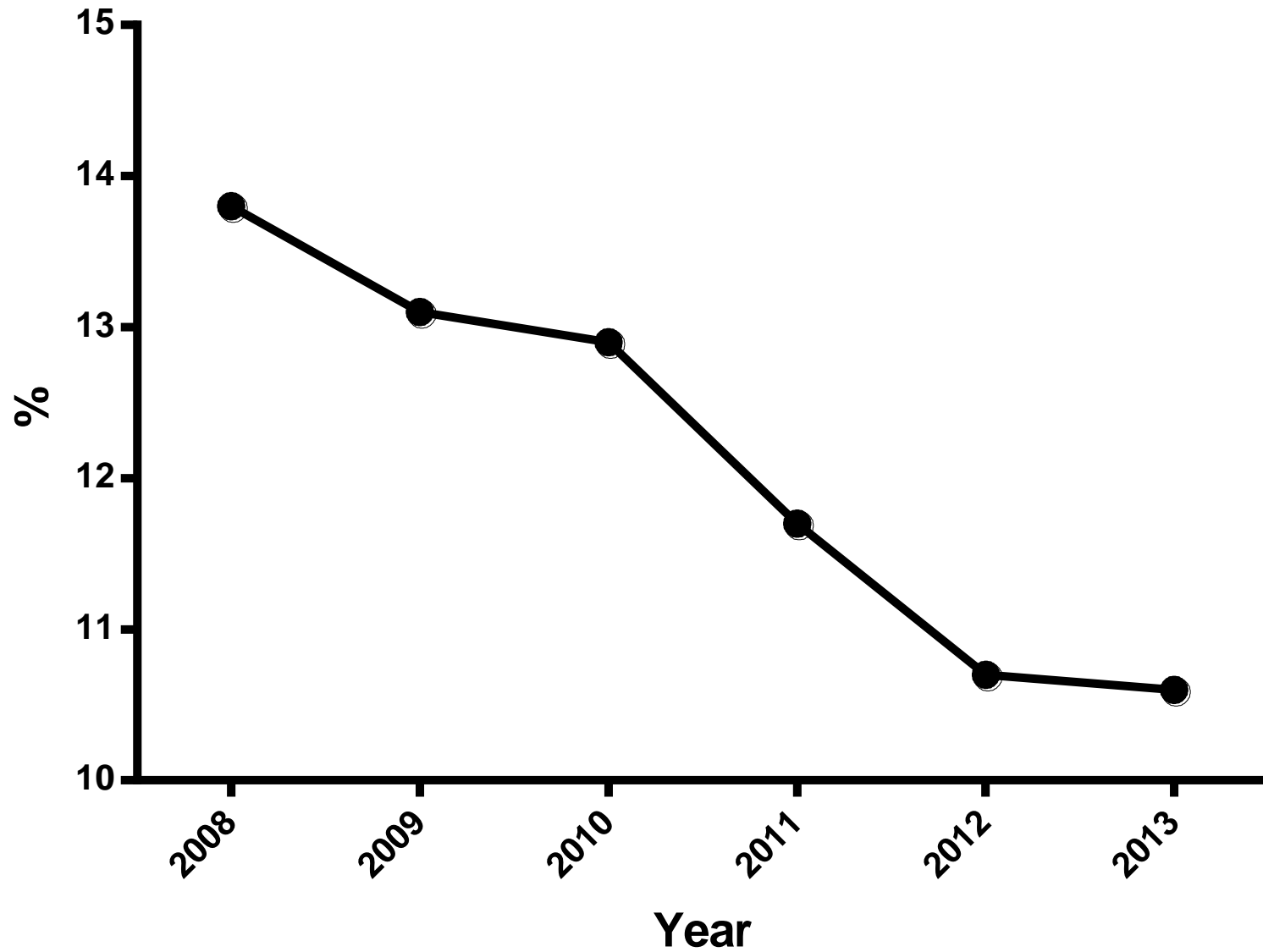


## Consortium Outcome Overview - Dead

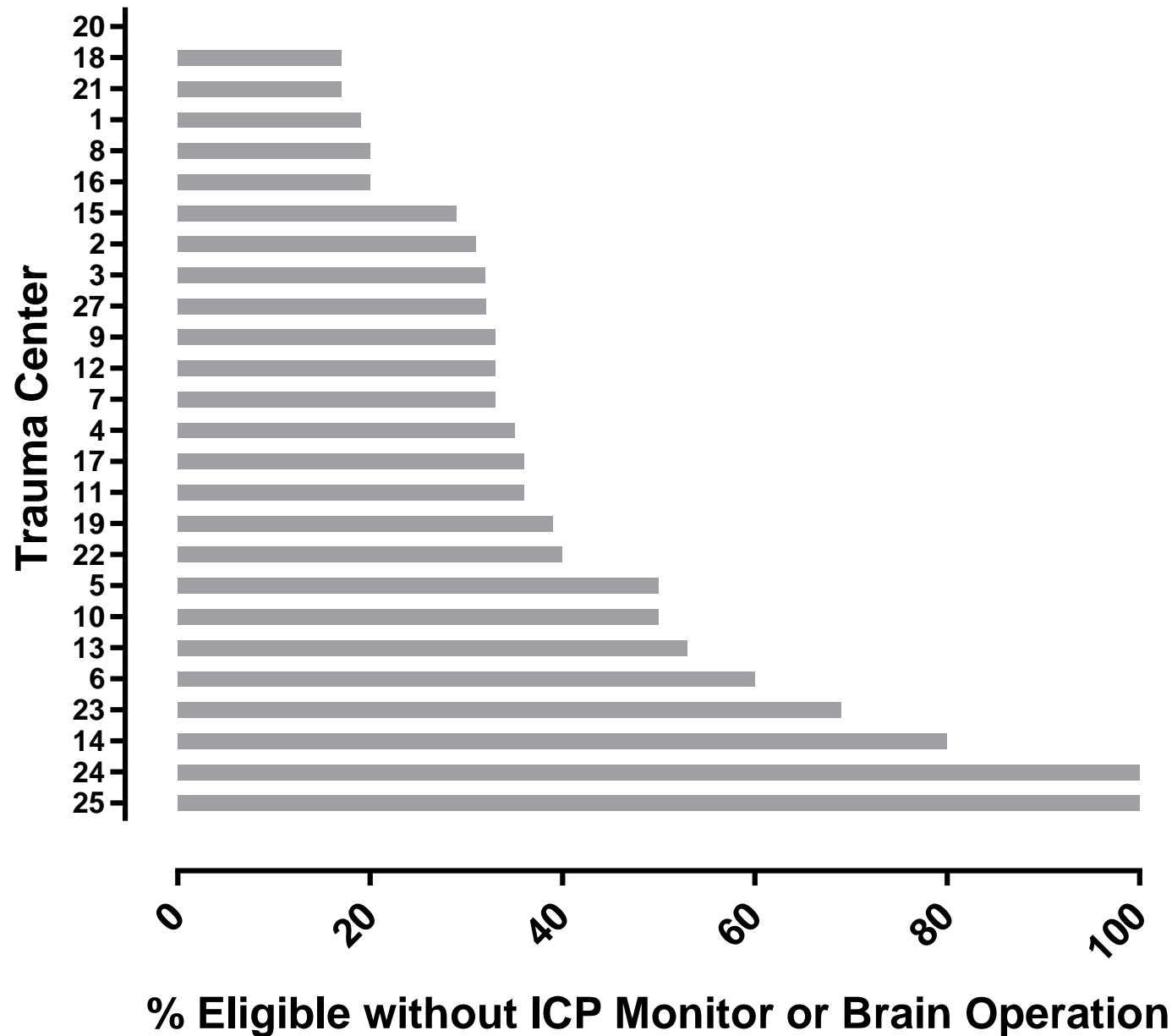




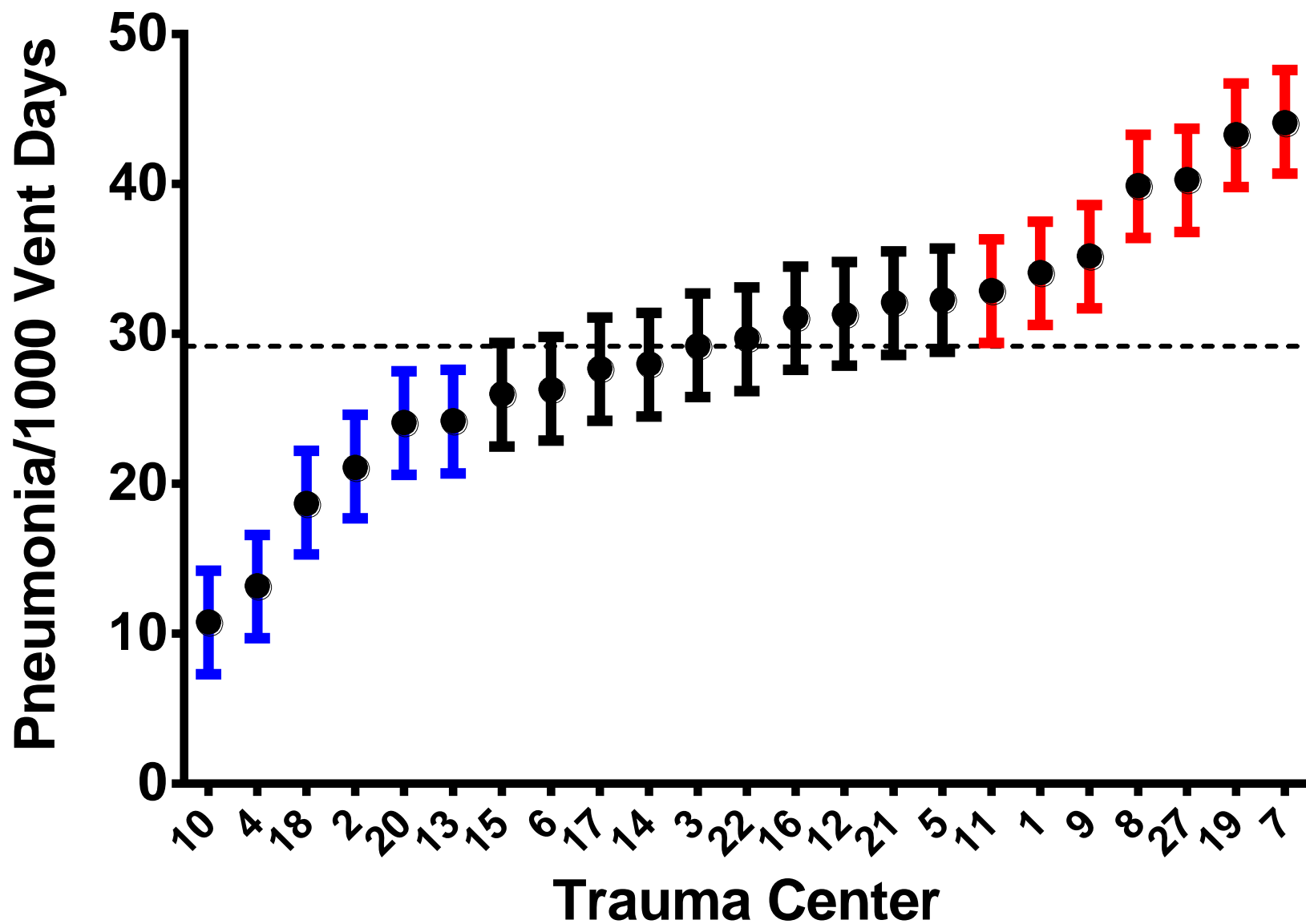
# Consortium Outcomes Overview - Serious Complications



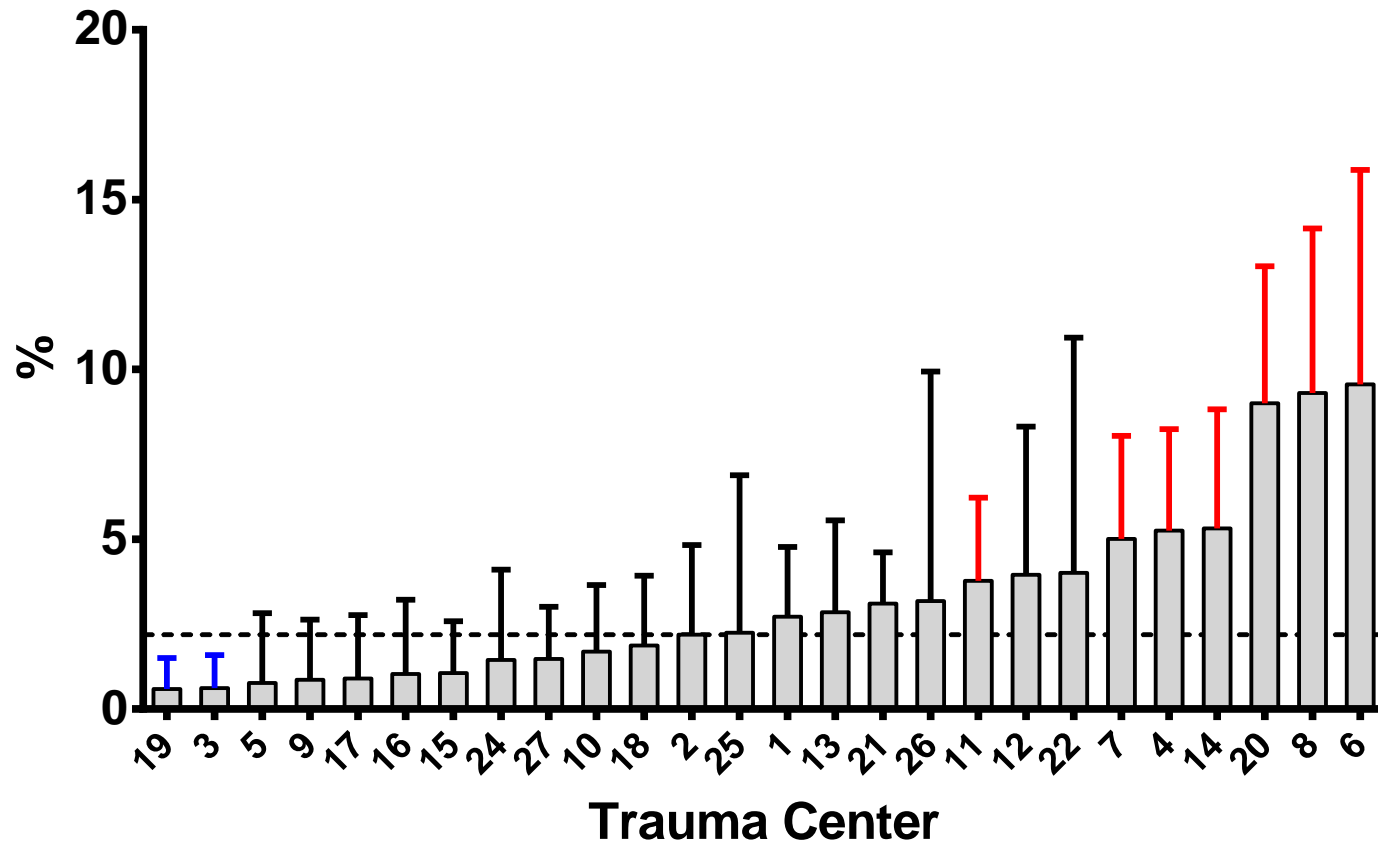
# TBI Intervention



# Adjusted VAP



## Risk and Reliability Adjusted IVC Filter Use



Mean IVC Filter Rate 2.6 → 2.2 %

# ACS TQIP BENCHMARK REPORT:

March 2014 - Michigan



AMERICAN COLLEGE OF SURGEONS

*Inspiring Quality:*

*Highest Standards, Better Outcomes*



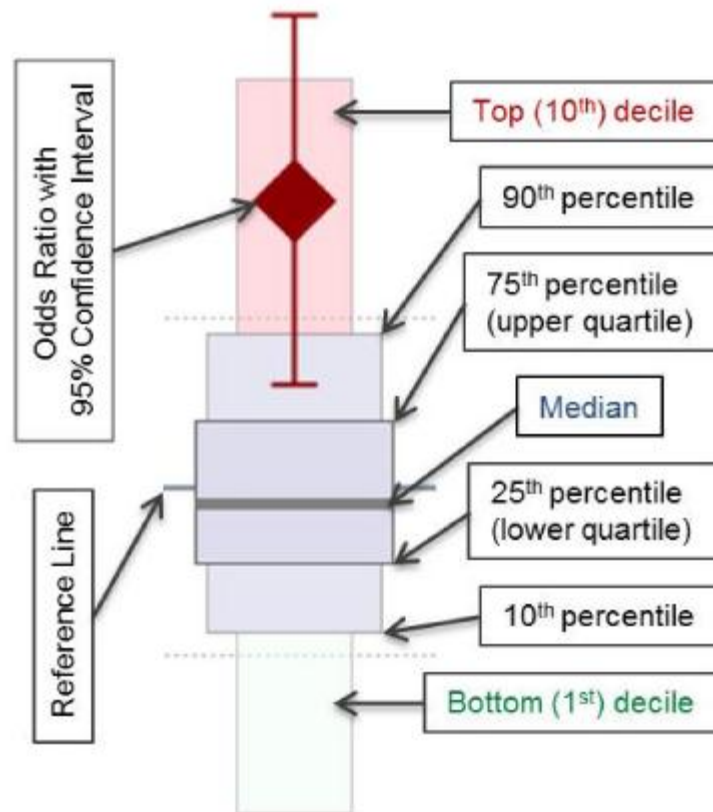


Figure 1: Risk-Adjusted Mortality

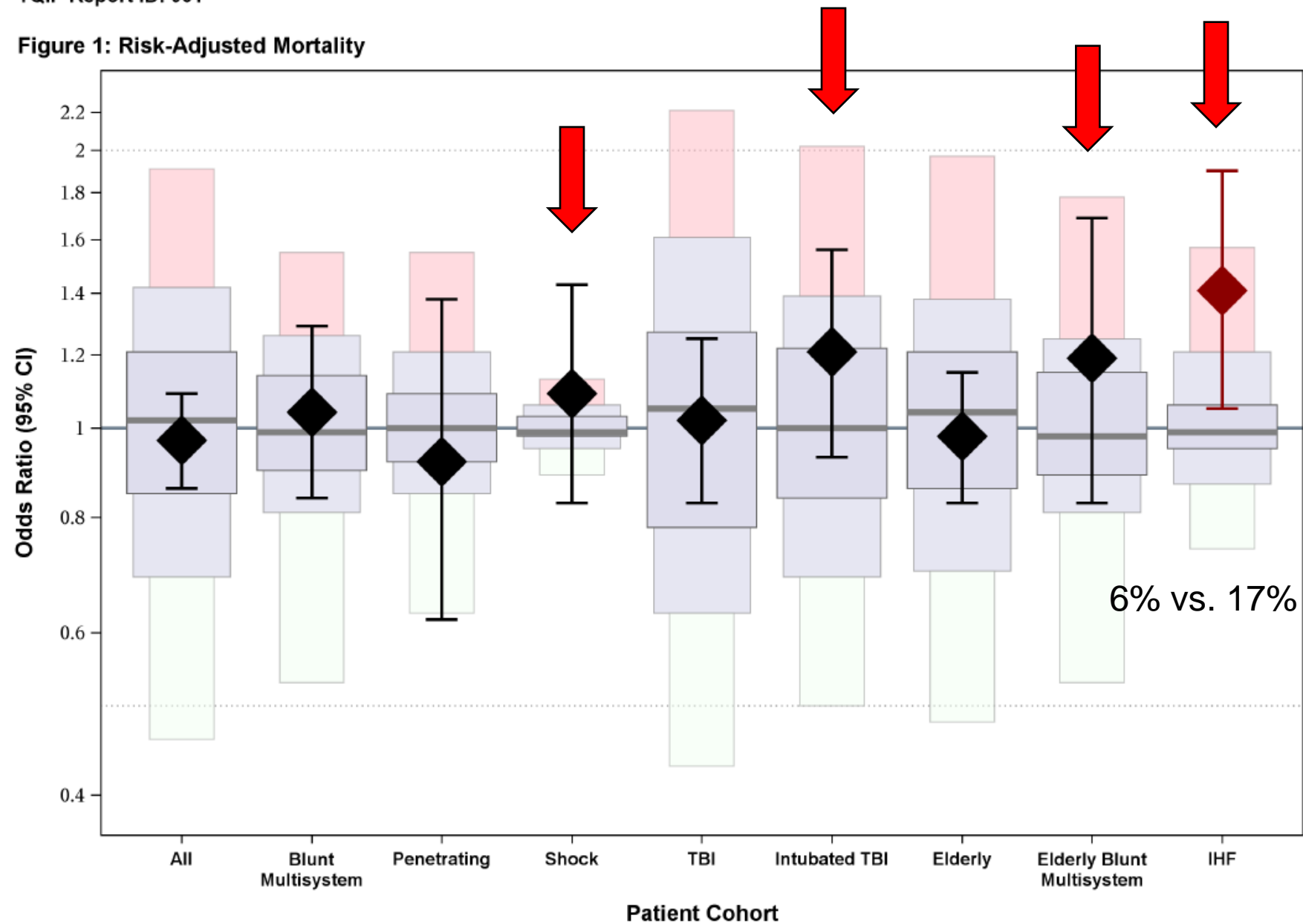


Figure 2: Risk-Adjusted Major Complications

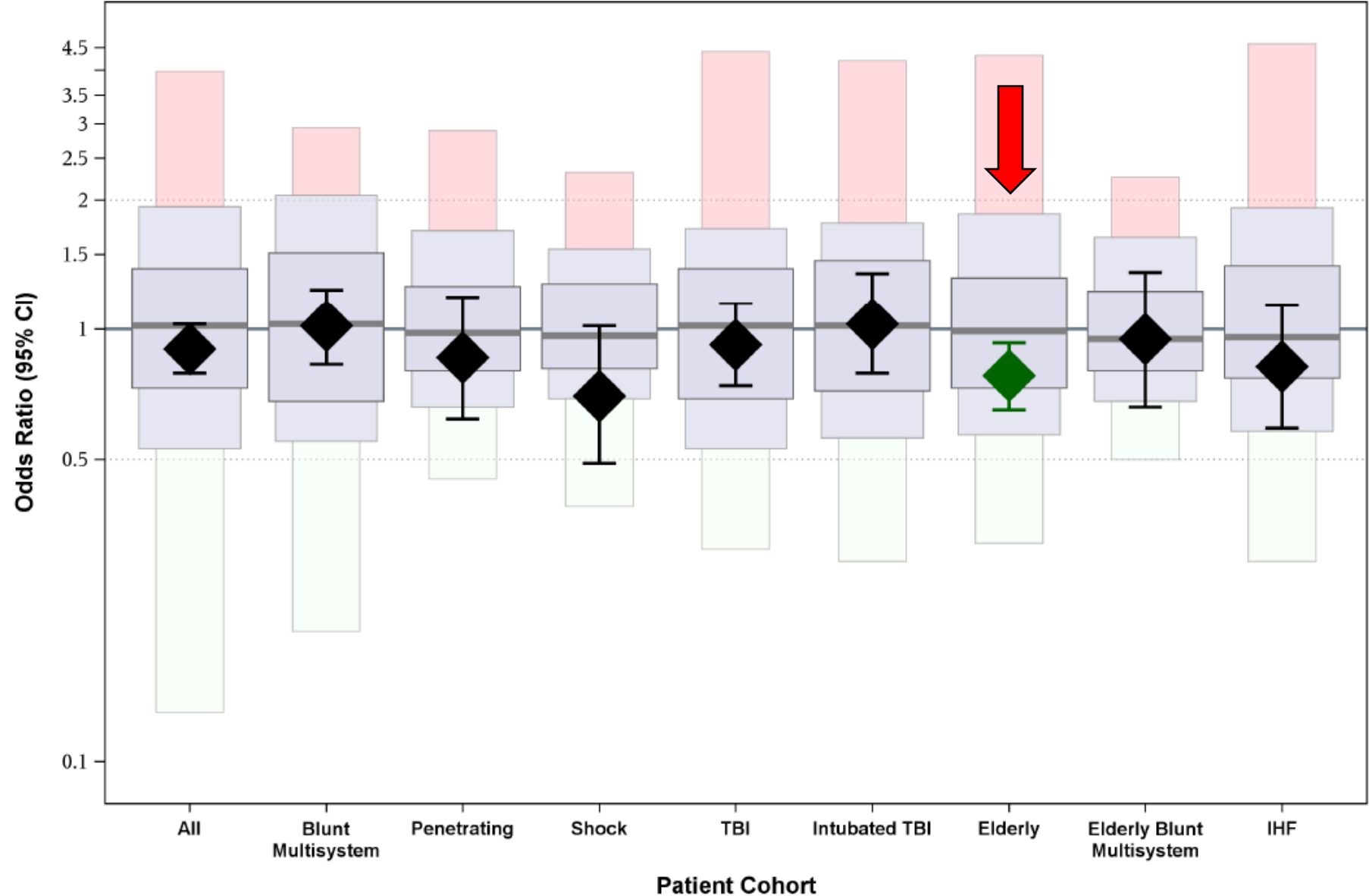
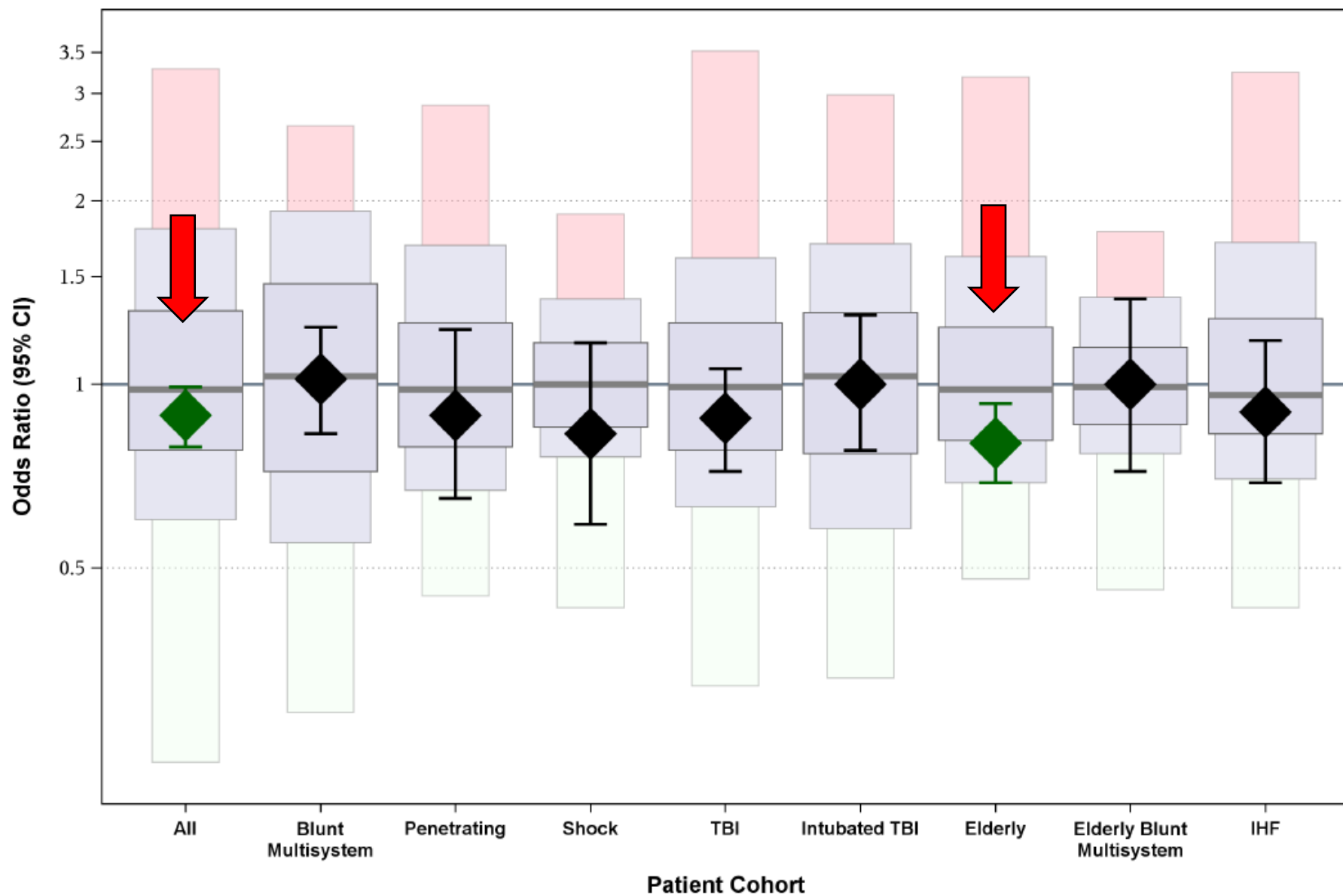




Figure 3: Risk-Adjusted Major Complications Including Deaths



# VTE

## ◆ DVT

- $\text{TQIP} = 1.8\%$
- $\text{MTQIP} = 1.3\%$

## ◆ PE

- $\text{TQIP} = 0.7\%$
- $\text{MTQIP} = 0.3\%$

# VTE Prophylaxis

- ◆ All
  - TQIP = 56%
  - MTQIP = 52%
- ◆ Intubated TBI
  - TQIP = 46%
  - MTQIP = 36%
- ◆ Elderly Blunt Multisystem
  - TQIP = 65%
  - MTQIP = 54%

# VTE Prophylaxis Type

- ◆ Heparin

- TQIP = 25%
- MTQIP = 44%

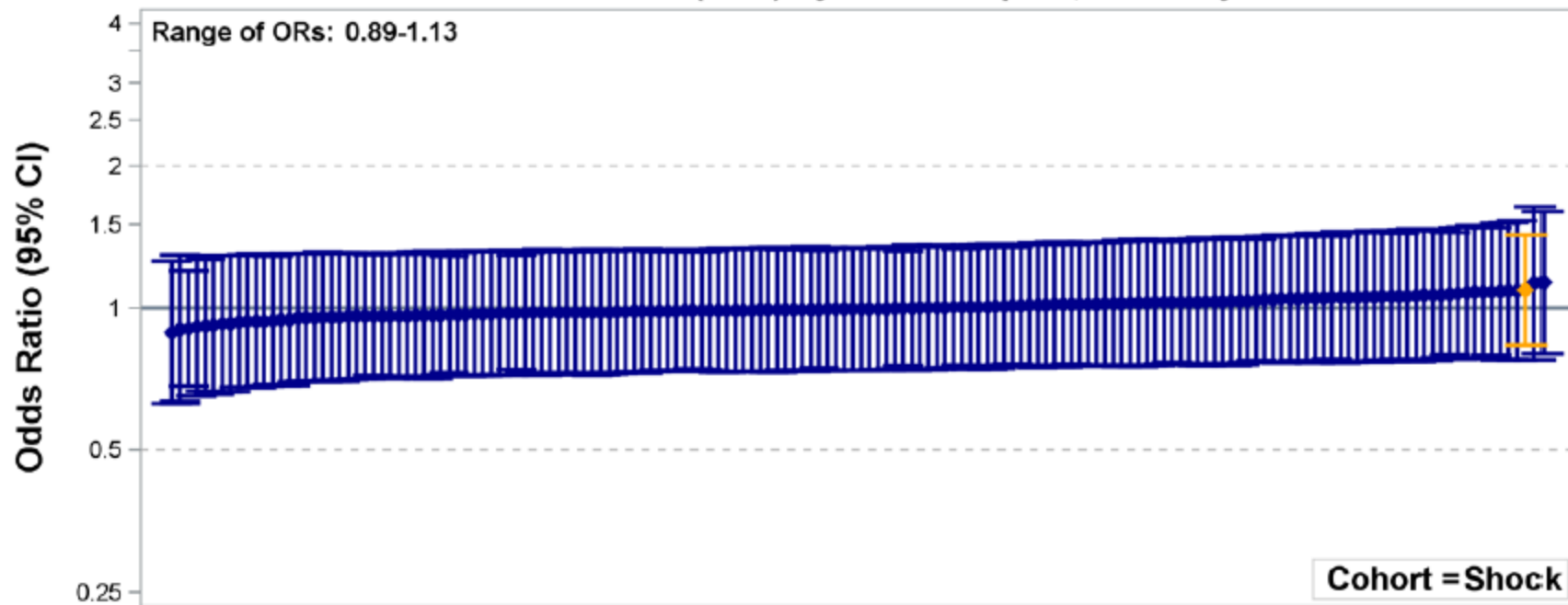
- ◆ LMWH

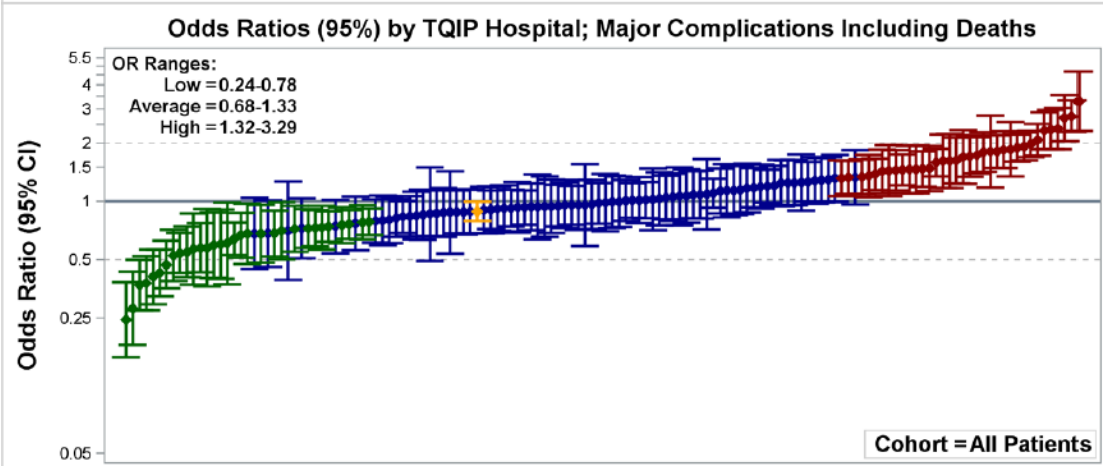
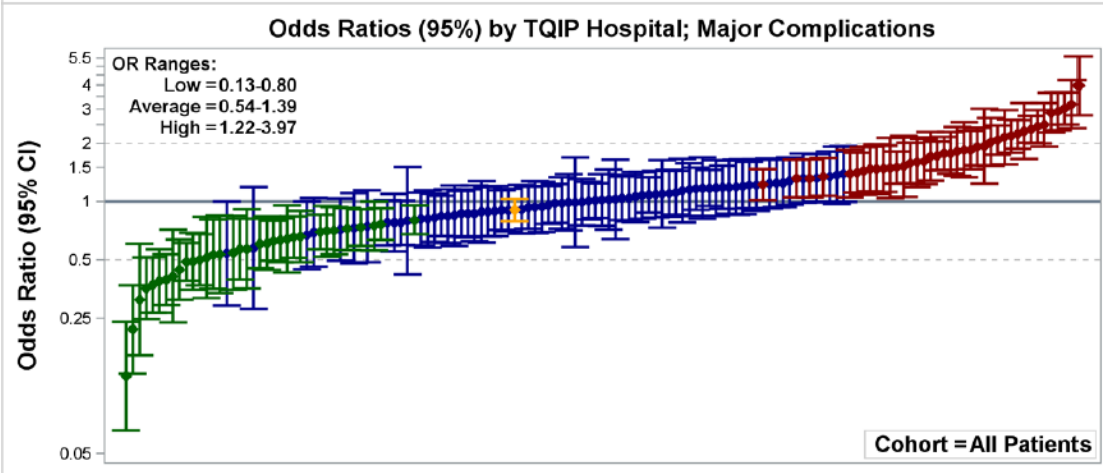
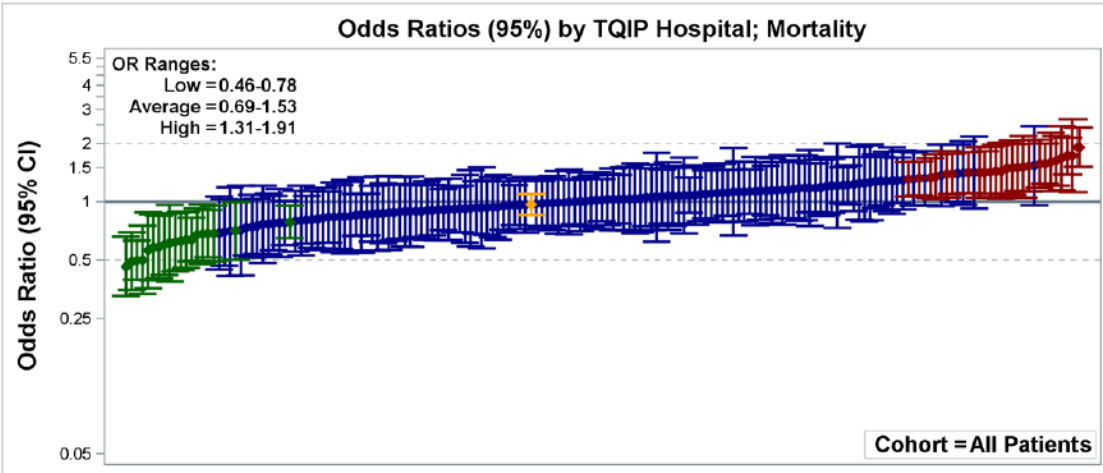
- TQIP = 72%
- MTQIP = 52%

# Hemorrhagic Shock

- ◆ Surgery for Hemorrhage Control
  - TQIP = 45%
  - MTQIP = 37%
- ◆ Median Time to Surgery for Hemorrhage Control
  - TQIP = 1.0 hrs
  - MTQIP = 1.9 hrs
- ◆ Angiography
  - TQIP = 14%
  - MTQIP = 13%

### Odds Ratios (95%) by TQIP Hospital; Mortality





# Future Meetings

- ◆ Fall
  - MCOT
  - Thursday
- ◆ Neurosurgery
  - Feasible?
  - When?
- ◆ Options
  - MSQC?
  - Friday/Saturday?



# **Data Validation New Data Elements**

**Jill Jakubus, PA-C**



# Overview

- ◆ Initiated March 30, 2010
- ◆ 21 centers
- ◆ 63 visits
- ◆ Over 40,680 elements validated

# Previous Models

- ◆ General validation
  - NSQIP methodology
  - Logic-based case selection
  - 103 variables/case
  - 10 cases over 2 days
- ◆ Focus variable validation
  - Logic-based case selection
  - Discrepancy-based variable selection
  - 18 variables/case
  - 10 cases over 1 day

# Process Improvement

- ◆ General validation
  - Low yield for low incidence events
  - Lacked concentration to specific user needs
  - Time intensive site burden
- ◆ General validation + focus variables
  - Initial promise
- ◆ Focus
  - Lacked significant impact

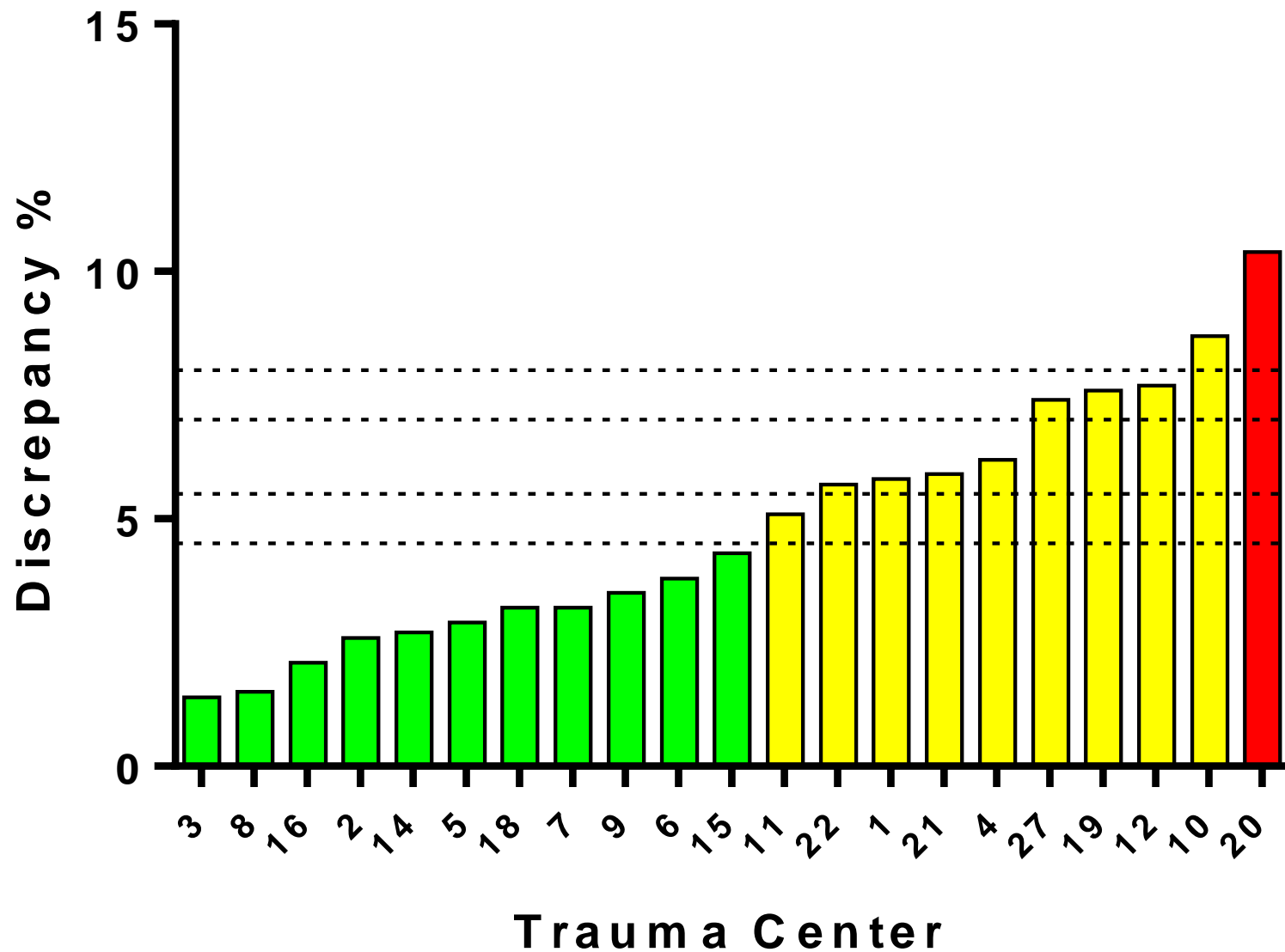
# Current Model

## ◆ General validation

- Logic-based case selection
- Variable selection based on impact & discrepancy
- Automated abstraction sheet adapts based on year
- ~100 variables/case x 7 cases
- 1 day visit
- Validation sheet sharing via MiShare
- 7 day appeal interval
- Center preferred date selection

# Validation Overall Discrepancy

(2014 4 centers, 2013 12 centers, 2012 3 centers, 2011 2 centers)



# Validation Discrepancy Rate by Category

| ID  | Date  | Visit # | ED   | Injury | Comorbidities | Operative | Blood | Complication | TBI  | VTE  | Discharge | Overall |
|-----|-------|---------|------|--------|---------------|-----------|-------|--------------|------|------|-----------|---------|
| 4   | 12/12 | 3       | 4.5  | 10     | 4.4           | 17.2      | 3.3   | 4.2          | 8.6  | 80   | 5.5       | 6.2     |
| 19  | 8/13  | 2       | 18.2 | 7.1    | 3.5           | 0         | 19    | 2.6          | 25   | 19   | 16.7      | 7.6     |
| 1   | 8/13  | 2       | 13   | 14.3   | 2.9           | 0         | 4.8   | 2.6          | 21.9 | 0    | 0         | 5.8     |
| 7   | 10/11 | 2       | 5    | 6.7    | 1.4           | 15        | 1.3   | 2.4          |      |      | 3.6       | 3.2     |
| 15  | 7/13  | 3       | 7.8  | 9.5    | 4             | 0         | 0     | 2.1          | 11.1 | 13.3 | 2.4       | 4.3     |
| 10  | 9/13  | 1       | 18.2 | 7.1    | 9.7           | 0         | 4.8   | 2.1          | 18.4 | 23.8 | 4.8       | 8.7     |
| 21  | 6/13  | 1       | 8    | 8.3    | 3.6           | 0         | 8.3   | 1.4          | 23.3 | 25   | 0         | 5.9     |
| 11  | 7/12  | 3       | 5    | 8.3    | 1.4           | 15        | 22.5  | 1            |      |      | 6.4       | 5.1     |
| 18  | 11/11 | 2       | 2.5  | 3.3    | 3.3           | 25        | 0     | 1            |      |      | 5.5       | 3.2     |
| 14  | 11/13 | 1       | 4.5  | 5.6    | 0.5           | 0.6       | 11.1  | 0.6          | 5.9  | 16.7 | 2.8       | 2.7     |
| 12  | 10/13 | 3       | 7.8  | 19     | 5.2           | 0         | 19    | 0.5          | 72.2 | 28.6 | 0         | 7.7     |
| 9   | 8/13  | 2       | 3.9  | 14.3   | 2.3           | 0         | 4.8   | 0.5          | 25   | 9.5  | 0         | 3.5     |
| 2   | 9/13  | 2       | 1.1  | 8.3    | 1.9           | 0         | 8.3   | 0.5          | 20.8 | 4.2  | 0         | 2.6     |
| 3   | 4/14  | 2       | 2.6  | 7.1    | 0.4           | 14.3      | 2.4   | 0.5          | 0    | 0    | 2         | 1.4     |
| 27  | 4/14  | 1       | 10.4 | 16.7   | 6.5           | 0         | 0     | 0.5          | 16.4 | 28.6 | 14        | 7.4     |
| 22  | 11/13 | 1       | 7.8  | 16.7   | 4.8           | 0         | 4.8   | 0.5          | 11.8 | 33.3 | 4.8       | 5.7     |
| 16  | 3/14  | 1       | 3.9  | 4.8    | 1.7           | 0         | 5.4   | 0.5          | 7.1  | 0    | 1.8       | 2.1     |
| 20  | 10/13 | 2       | 13   | 9.5    | 6.5           | 0         | 19    | 0            | 65.1 | 9.5  | 16.7      | 10.4    |
| 6   | 1/12  | 2       | 3.5  | 13.3   | 2.4           | 5         | 17.5  | 0            |      |      | 0.9       | 3.8     |
| 5   | 3/14  | 1       | 6.5  | 11.9   | 2.2           | 0         | 0     | 0            | 5.4  | 14.3 | 0         | 2.9     |
| 8   | 10/13 | 1       | 3.9  | 0      | 0.4           | 0         | 0     | 0            | 23.1 | 0    | 0         | 1.5     |
| Ave |       |         | 7.2  | 9.6    | 3.3           | 4.4       | 7.4   | 1.1          | 21.2 | 18.0 | 4.2       | 4.8     |



> 4.5%



Highest rate per category

# Future Model

- ◆ Time lag
  - Unconstrained submission
  - XML
- ◆ Site burden
  - Remote validation progress
- ◆ Systematic dimensions
  - Strategic registrar collaboration
  - Lean
  - TQIP
  - Logic



# Direction

## Current Logic

- ISS < 16 and mortality
- ISS > 24 and no complications and hospital days > 1
- Length of stay > 14 days and no complication or mortality
- Age > 64 and no co-morbidities
- Mechanical ventilator days > 7 and no pneumonia
- Motor GCS = 1 and no complications and hospital days > 1

# New Data Elements

- ◆ MTQIP

- Antibiotic days

- ◆ TQIP

- Pre-hospital cardiac arrest

- Indication of whether patient experienced cardiac arrest prior to ED/Hospital arrival.